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ABSTRACT

This monograph describes the system of higher education in the United Soviet Socialist Republics (USSR). The preface points out that despite perestroika, two features of Soviet education persist, a high degree of unity and centralization and a close link between higher education and employers. Chapter 1, "Historical Overview," begins with 4th century origins of higher education and goes on to treat 19th and early 20th century developments as well as those of the socialist period. Chapter 2, "Higher Education in the Context of Perestroika," outlines the conflicts and changes involved in the current restructuring. Chapter 3, "Organizational Patterns and Management," reviews basic principles, pre-school education, universities, and advanced and specialized institutes. Chapter 4, "Selection of Students and Composition of Student Contingents," discusses recruitment and the student population. Chapter 5, "The Instructional and Learning Process," treats pedagogical approaches. Chapter 6, "Higher Education and Research," describes sponsorship, achievements, and student involvement. Chapter 7 is titled and discusses "Postgraduate Course Programmes, the Recruitment and Promotion of New Staff Members, and Continuing Education." Chapter 8, "The Planning and Financing of Higher Education," discusses institutional financing, salaries, and student stipends. Chapter 9, "Higher Education and Soviet International Co-operation," describes relationships with other nations. An appendix provides 15 tables of data. Included are 15 references. (JB)

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PREFACE

CEPES is pleased to present *Higher Education in the USSR*, the fourteenth volume in its series on the higher education systems of the Europe Region of Unesco. In addition to being one of the two largest higher education systems in the world, the higher education system of the USSR is certainly the most spread-out geographically and the most diverse from the linguistic and cultural point of view.

CEPES has already published separate studies on the higher education systems of the Byelorussian SSR (1983) and the Ukrainian SSR (1985). In the years that have followed, however, the USSR as a whole has experienced, and is still experiencing, *perestroika* — restructuring — a vast and profound process which is leaving its mark on virtually all aspects of Soviet institutional life, higher education included. Therefore this volume, which is very much about *perestroika* and higher education, complements the two earlier volumes and places the higher education systems of the two Union republics in question within the larger perspective of the country as a whole. However, as *perestroika* is an on-going process, the higher education system described remains very much in flux, subject to continuing modifications, only hinted at so far. Consequently this volume is much more an interim report than a final statement.

Perestroika notwithstanding, certain basic features, which characterized the higher education system of the USSR as a whole before the process got underway, remain. One of these is certainly the degree of unity and of centralization of the system as a whole at the top, despite the size and diversity of the country, a trait which has in fact been reinforced by the recent creation of the USSR State Committee for Public Education. This administrative organ, which has replaced and assumed the functions of the Ministry of Education, the Ministry of Higher and Specialized Secondary Education, and the State Committee for Vocational and Technical Education of the USSR, not only administers primary and secondary education but has also acquired, in the domain of higher education, increased supervisory authority over the so-called sectoral institutions — those specialized higher education institutions administered directly by their corresponding ministries. But paradoxically, this drive to concentrate and to standardize educational administration at the top is being accompanied by an effort to decentralize the operations and above all the financing of the individual higher education institutions throughout the country and to make them increasingly responsive to

their local economic, social, and cultural environments.

A second characteristic feature is the very close link between higher education, industry, and employing organs in general. The linkages composing it, which are in the process of being extended, refined, and diversified reflect Soviet originality and sophistication in the domain with roots going back to the October Revolution.

CEPES is particularly grateful to the USSR State Committee for Public Education and to the authors for having not only prepared a first draft of the manuscript but also for having revised it extensively to take account of the ongoing results of *perestroika*.

Carin Berg
Director CEPES

INTRODUCTION

The higher education system of the USSR as it exists today is an integral part of the complex socio-economic fabric of the country.

All the Union republics and the economic regions boast wide networks of higher education institutions having a total enrollment of more than five million and graduating about 850,000 students annually. All of the 15 million Soviet graduates of higher education institutions are employed in the national economy. One out of nine of all the persons employed in the country is a university graduate. This figure represents a graphic example of how the tasks of raising the educational and professional levels of working people and of developing the intellectual potential of society can be accomplished efficiently in a short period.

The higher education institutions not only train qualified specialists for the national economy but also constitute a significant component of the scientific potential of the country. The staffs of the various institutions include more than 20,000 Doctors of Science and about 220,000 Candidates of Science who, apart from lecturing, are active in the development of new scientific trends and advanced technology and resolution of current problems of social development.

This monograph begins with a short historical survey of Soviet higher education. It describes the organizational pattern, the functions, and the tasks of the higher education system as well as its current state of affairs and its prospects for development. The Annex includes tables of statistics which illustrate trends which have appeared in university education in the Soviet Union over the last 25 years.

1. HISTORICAL OVERVIEW

1.1. Origins

The origins of higher education over the present-day territory of the Soviet Union go back to the remote past. Among the precursors of the higher education institutions of today were the academies founded in Kolhida in the fourth century A. D. and the three academies established in the 11th and 12th centuries in Ikaltea, in Gergy, and in Ghelati. The academy of Ghelati (located near Kutaissi) was not only an ecclesiastical centre but also a centre in which such subjects as arithmetic, geometry, astronomy, philosophy, grammar, rhetoric, and music were taught. Although the academy inaugurated in Vilnius in 1579 was granted the rights and privileges of a university, it was used mostly to suit the purposes of the Roman Catholic Church. It was reorganized as a university in 1803. The history of the University of Tartu, one of the oldest higher education institutions in the country, goes back to the founding in 1632 of the Gustavian Academy, an institution that functioned intermittently until 1710. It was reopened in 1802 as the University of Dorpat (the name was changed to University of Yuriev in 1803; it finally became the University of Tartu after 1918).

The first Russian-Ukrainian institution of higher learning, one combining aspects of secondary and university institutions, was the Kiev-Moghilyansk Collegium, established in 1632. It offered instruction in Slavonic, Greek, and Latin and in the seven liberal arts. It was the most significant educational centre in the south-western part of the country in the 17th and 18th centuries. Many prominent figures in culture and education were either on its staff or among its graduates.

A similar Slavonic-Greek-Latin Academy founded in Moscow in 1687 had a curriculum which included Greek, Latin, and Slavonic; the seven liberal arts, and theology. Its graduates included Mikhail Lomonosov, the great Russian scholar and scientist; Stepan Krashe-ninnikov, a traveller in and explorer of Kamchatka; Dmitry Vinogradov, the inventor of Russian porcelain; Vasily Trediakovsky, a poet and philologist; Vasily Bazhanov, the architect; Leonty Magnitsky, the author of the popular Arithmetic textbook; and Antiokh Kantemir, a writer and diplomat, who was the founder of classicism and satire as trends in Russian literature.

Since 1755, when the University of Moscow was opened, the Academy served to educate young people who devoted themselves to

the Church. In 1814, the Slavonic-Greek-Latin Academy was transferred from Moscow to the Troitse-Sergiyev Monastery in Zagorsk, where it exists to this day as the Moscow Theological Academy.

As of the late 17th century, a new type of specialized institution of higher learning began to appear in Russia as the result of the economic development of the country and of its need for qualified specialists. Thus the School of Mathematics and Navigation was set up in Moscow in 1701 and the Naval Academy, in Saint-Petersburg, in 1715. The first true Russian university, the University of the Academy of Sciences, was also founded in Saint-Petersburg, at about the same time. The latter institution offered courses in ancient and modern languages, as well as in philology, mathematics, physics, chemistry, geography, and history. Unlike European universities, Russian universities never included theology in their curricula.

On Lomonosov's initiative and according to his plan, a university was founded in Moscow in 1755. It marked the beginning of the democratic training of specialists through higher education.

1.2. Nineteenth and Early Twentieth Century

With the establishment of Moscow University and later, in the early 19th century, of the Universities of Kazan (1804) and of Kharkov (1805), the academies lost their roles as general education institutions. Specialized higher education institutions became the requirement of the time; therefore, a School of Mines was founded in Saint-Petersburg in 1733 (today, the Institute of Mines); a Geodetic School, in Moscow in 1799 (today, the Moscow Institute of Geodesy, Aerophotography, and Cartography); an Academy of Medicine and Surgery, in Saint-Petersburg in 1798 (today, the Military Medical Academy), an Institute of Forestry in Saint-Petersburg, in 1803; the Lazarev Institute of Oriental Languages in Moscow, in 1814; the Main Teacher Training Institute in Saint Petersburg in 1816; and the Moscow Higher Technical Institute (today, the Bauman University of Technology).

During the period that followed, the tsarist government restrained the development of the higher education system and put obstacles in the paths of members of the bourgeoisie who attempted to organize the training of specialists in order to meet the needs of developing industries and trade. For this reason, only a few institutes were opened. These included the Institute of Civil Engineering (1832), Kiev University (1834), the Veterinary Institutes in Dorpat (1848) and Kharkov (1851), and the Conservatory in Saint-Petersburg (1852).

As a result of the rapid development of capitalist production in Russia in the second half of the 19th century, new higher education institutions were opened to meet the growing need for engineers and other kinds of specialists. These included the Polytechnic Institute of Riga (1862), The Petrov Academy of Agriculture and Forestry near Moscow — today, The Timiryazev Agricultural Academy (1865),

The Novorossiisk Institute in Odessa (1865), The Institute of History and Philology in Saint-Petersburg (1867), and others. In 1895, more than 5,000 students were being educated at the 11 higher technical institutions in the country, while the total number of students in the institutions of higher learning and vocational technical schools (245 all in all) reached 207,000.

But at the same time, the development of higher education in tsarist Russia lagged behind the requirements of the country for highly educated and trained people. In 1915, the Russian Empire with its 160-million strong population had only 105 institutions of higher education with a total student enrollment of 127,400. These were to be found only in its European part. The chauvinistic policy of the autocracy hampered the development of higher education in the non-Russian territories. Thus, not a single institution of higher learning was to be found in the present-day territories of the Byelorussian, Lithuanian, Moldavian, Azerbaijan, Armenian, Kazakh, Uzbek, Turkmen, Kirghiz, and Tajik Soviet Socialist Republics. The number of higher technical institutes expanded slowly, most of them being founded only in Saint-Petersburg and in Moscow. Only one technical institution, that of Tomsk, was to be found in all of Siberia, and not a single one was to be found in the vast territories of the Urals, the Caucasus, and Central Asia despite the extremely rich and diversified resources of these regions that were of great significance for the industrial development of the country.

1.3. The Socialist Period

Following the October Socialist Revolution of 1917, a major effort was undertaken to expand the network of higher education institutions and to restructure the system of education as a whole to make it more democratic and to meet the interests of the masses. According to decisions taken by the Soviets of People's Commissars as worked out by V. I. Lenin in 1918, all those willing to study had free access to the institutions of higher learning, irrespective of class affiliation, nationality, and sex. Important measures were taken to facilitate the access to higher education institutions of working people. These included the elimination of tuition fees and the introduction of maintenance stipends for students from families of workers and peasants. In addition, workers' faculties, which played an important role in changing the social composition of students as a whole, were established in various higher education institutions (thus, during the 1925-1926 academic year, graduates of the workers' faculties made up 40 per cent off the total number of those admitted to higher education). New institutions were opened, and the existing ones were expanded and restructured. In 1918 on V. I. Lenin's initiative, the Academy of Mines was opened in Moscow. Several universities, including those of Nizhny Novgorod, of Tiflis, of Dniepropetrovsk, of Irkutsk, and of Voronezh, were opened in 1918. Azerbaijan Univer-

sity was opened in Baku in 1919; Turkestan University in Tashkent and Yerevan University were opened in 1920. As of the 1921-1922 academic year, the country had 272 higher education institutions with a collective enrollment of more than 220,000 students. A total of seven institutions were functioning in Byelorussia; five, in Azerbaijan; four, in Uzbekistan; one, in Armenia, and one in Kazakhstan. In order to bring the engineering and the technical institutes closer to actual industrial production, they were transferred, between 1928 and 1930, to the jurisdiction of the ministries corresponding to the given industries.

The years of the first five-year plans were marked by a rapid pace in the development of higher education. For instance, by the end of the first five-year plan (1931-1932), the country had more than 700 institutions which trained about 406,000 students. During that period, the various course programmes offered were planned and structured so as to meet, to an ever increasing extent, the needs of science, of culture, and in general, of the economy.

By the beginning of the Second World War, the Soviet Union had 817 institutions of higher learning, with a total student enrollment of 800,000. Over one million graduates of these higher education institutions were employed in different branches of the national economy, contributing greatly to the industrial production, the science and technology, the culture, and the health protection of the country.

During the arduous years of the Second World War, the Soviet government gave particular attention to the preservation of the national higher education system and of its cadres. Many of the institutes and universities were evacuated to the eastern regions of the country where they continued to train specialists. During these years, 60 new institutes were opened. Nevertheless, the war seriously undermined higher education. By 1942 the number of institutions had declined from 817 to 460. According to the extraordinary state commission for the investigation of the crimes of the fascist occupants, 334 higher education institutions, which had enrolled up to 233,000 students, were destroyed, while the equipment of laboratories and study rooms, as well as the unique items in university libraries and other kinds of collections were removed to Germany.

The reconstruction and the reopening of the institutes and universities in the occupied zones were launched immediately after liberation. Despite the enormous difficulties which the USSR had to contend with in order to recover from the devastation of war and to revitalize the national economy, the various higher education institutes were well provided for by the State. Restructuring went hand in hand with reconstruction. Smaller institutes were merged with larger ones. New institutes and universities were opened, particularly in the eastern regions of the country, and the number of students increased correspondingly. In the autumn of 1945, students were being trained in 789 institutions of higher learning, which altogether represented 96.6% of the number of institutions which had

existed before the war. During the same academic year, the total student enrollment reached 730,000 or 90% of the largest pre-war enrollment. The number of institutes linked with heavy industry, building, transport, and communications, as well as physical education and sports was not only restored by the end of the war, but became even greater than during the pre-war period. More than one million students were admitted to Soviet higher education institutions in 1980 — four times more than before the war. Currently, 900 institutions of higher education in the USSR with a collective enrollment of 5, 147,000 are distributed among 350 cities.

2. HIGHER EDUCATION IN THE CONTEXT OF PERESTROIKA

2.1. Emerging Contradictions

Even as Soviet higher education continued, in recent years, to increase its output of specialists, it sometimes failed to give due concern to the quality of the training offered and to the relevance of the latter to the demands of contemporary production. In many cases, the types of training offered and the numbers of graduates in given fields have not corresponded either to the needs of given industries or of individual regions. A result of the extremely centralized way in which training has been planned and administered in the various institutions has been the tendency to give greater importance to the number of students graduated than to the quality of their training. At the same time, the research conducted in the universities and other institutions of higher education has tended to become formalized, while losing touch with the research programmes of industry.

2.2. Formulation of Guidelines for the Restructuring of Higher Education

Ways of eliminating negative trends in the development of higher education have been proposed in the document entitled "Guidelines for the Restructuring of Higher and Secondary Specialized Education in the Country", which was drafted by the Party and the State after thorough nationwide discussions had been held on the subject. The persons who drafted the document also took into account the prior experience of Soviet higher education, the education systems of the other socialist countries, and international experience as a whole. Its scope is such that it gives consideration to the political, economic, and social restructuring of Soviet society as a whole.

The characteristic feature of this restructuring of higher education is, first of all, that it is a part of the all-embracing restructuring of the political and economic system and the radical transformation of economic management. Secondly, it is linked to the restructuring of the education system as an integrated whole. Thirdly, it is an all-encompassing process which touches upon all aspects of higher education: its organizational and management structure, its content, the forms and methods of teaching, its scientific and research activity, its student boards, its institutional staff, and its material and finan-

cial resources. Fourthly, the restructuring of higher education assumes that the latter is an integral part of a system of lifelong education.

What is most significant about the development of Soviet higher education in the context of *perestroika* and of an active social policy is its growing contribution to social development. Thus higher education is increasing its influence on the processes whereby the educational and cultural level of the population of the Soviet Union is being raised, the social structure is being modified, and the differences in educational level between town and village, eliminated. The *perestroika* of higher education is opening new vistas for national development and is turning the educational process into a powerful means for the transformation of society.

2.3. *Perestroika* and the Management of Education

Public education in the USSR is managed by the organs of state power at the All-Union level and at the level of individual Republics. In order to improve management, the organs in question, particularly the local Soviets of People's Deputies and their executive committees, carried out a reorganization of the organs of management as part of the process of *perestroika*. The Ministry of Education of the USSR, as well as the State Committee for Vocational Training and Technical Education of the USSR were abolished. All three were replaced by a new State Committee for Public Education of the USSR which was organized in accordance with a special resolution of the Presidium of the Supreme Soviet. This State Committee is responsible for the elaboration of strategy and for educational planning. It is called upon to accomplish different tasks which are directed at the elaboration and the realization of the concepts of general secondary education and the active use of effective forms of integration of educational institutions with industrial production and science. It is called upon to manage the equipping of the higher education institutions with modern technical apparatus to be used for educational purposes; to supervise the scientific, methodological, and organizational management of the systems of continuing education, advanced training, and retraining for employed specialists; and to raise the potential of higher education institutions.

Along with the general improvement of the system of centralized management of public education, a movement in favour of democratization has also been unleashed. The latter has taken the form of an enlistment of co-operation on the part of public organizations and the development of independent collectives in higher education institutions through a widening of the forms of student participation in management.

The Soviets of People's Deputies at all levels are playing an ever increasing role in the lives of educational institutions.

The Congress of Public Education Workers which was held in 1988 was of utmost importance for the *perestroika* and the democrati-

zation of all aspects of the activity of public education. The Congress discussed a number of basic documents, with regard to *perestroika* in the general secondary and the vocational training schools, and in the whole system of specialized secondary and higher education. A special All-Union Council for Public Education was formed at the Congress the principal task of which is the continuous consideration of the state of affairs of public education. The effects of the active public influence of relevant commissions and committees of the Supreme Soviet of the USSR on the development of public education are already being observed. Consequently, *perestroika* is changing the management system of public education from one of state management to one of public (social) management.

2.4. Social and Economic Functions

Higher education in the Soviet Union also performs an essential social function which includes the training of highly skilled specialists to fill posts in various public and state establishments including education institutions. It also includes the moral and aesthetic training of students whereby they are imbued with the spirit of peace, patriotism, and internationalism, and with a love of man and of nature.

The research function of higher education is derived from the very nature and structure of institutions of higher learning which have traditionally integrated research and the instructional process. The universities in particular carry out fundamental and interdisciplinary research in the natural and the social sciences as well as in the humanities. The work is done by the various teaching staff members, by professional researchers, and by postgraduate and undergraduate students.

In order for the above-stated function to be undertaken efficiently and in harmony with the rapid socio-economic development of Soviet society, a new high quality system of stable integrated links between higher education, science, and production must be elaborated. Thus the principal mechanism for the restructuring of higher and specialized secondary education is their complete integration, according to new principles of interaction, with production and science.

2.4.1. Higher Education - Industry Linkages

Many Soviet institutions of higher education currently have extensive contacts of various kinds and at various levels with industry. Certain institutes and research organizations, for instance, have established departments in the very plants with which they are linked. Here specialists are trained in specific areas, undertake practical work, prepare term papers and graduation theses, familiarize them-

selves with their future workplaces, and are supervised by experienced tutors in their respective fields. By the end of 1987, 500 branches of departments of higher education institutions had been opened in various enterprises. Some 200 more links of this kind are being planned. Nevertheless, this type of linkage has been adopted by only one percent of the total number of departments of higher education institutions in the USSR. Increasing this number is thus a major priority, particularly with regard to links between basic industrial enterprises and higher education institutions. The latter type of linkage is viewed as the proper embodiment of the integrational processes and their acceleration in the education-science-industry complex.

The training of specialists by means of linkages between higher technical institutions and industrial plants in ways that combine classroom instruction and productive labour has a relatively long history so far as Soviet education is concerned. The higher education institutions in question are situated in or near the relevant plants. These provide the institutions in question with the necessary laboratory and technical equipment. Such close contacts between formal study and production enable the students involved in them both to satisfy the specific needs of the plants in question and to acquire training and experience. For instance, graduates of the higher technical institution located at the Likhachev Motor Works in Moscow have been filling positions in the motor works of the city for many years.

Many linkages between higher education institutions and production are developing on a contractual basis. The functions involved include the training of personnel, the carrying out of research, and the dispensing of scientific and technical assistance. The contracts which are of a comprehensive nature may deal with co-operation between industries and institutions of higher learning, scientific and technical co-operation, the training of specialists to execute the orders of industries, industrial research, and the setting up of branches of higher education institutions (departments, laboratories, even whole faculties) in given plants.

A good example of such co-operation based on contractual relations is the linkage of Lomonosov University and the Likhachev Motor Works for the training and the retraining of personnel, the provision of the necessary equipment for research and design, and the development and the introduction of state-of-the-art technology.

Co-operation on a contractual basis is developing successfully between medical institutes and public health services. As an example, the Sechenov Medical Institute in Moscow has signed contracts for co-operation with about 100 hospitals, polyclinics, prophylactic centres, and other medical establishments in the capital according to which it arranges consultations for patients, refresher courses for medical personnel, and the like.

A good example of how contractual relationships can aid in preparing the specialists who will complete orders placed by industries is given by the Moscow A. N. Kosygin Textile Institute. The institution, a typical example, has contractual relations with almost 100

textile mills throughout the country, thus facilitating the training of textile specialists so that they may meet the specific needs of individual regions and of groups of mills. About 30 percent of the annual enrollment in the institute is made up of students recruited by the textile mills. This type of co-operation will expand in the future.

2.4.1.1. The UNPK's

A good example of a new form of co-operation which is coming into being is the development of Educational, Scientific, and Industrial Complexes (abbreviated UNPK's). These organizations are intended to co-ordinate the joint activities of enterprises and of higher education institutions with regard to the training of specialists, the undertaking of research projects, the verification and the application of the results of the latter, and the raising of the professional skills of teachers and of workers. In short, UNPK's, in the areas in which they work, will integrate science, education, and industry.

One UNPK, *Gigant*, has already begun to give results and to serve as an example for others. Established through the inter-linking of several enterprises and educational institutions, including the "Voskresenskement" Industrial Association, the Voskresensk "Red Builder" Association of Asbestos and Cement Manufacturing Enterprises, the Cement Research Institute, the Asbestos-Cement Scientific and Industrial Association, the Voskresensk Chemical and Mechanical-Technical Secondary School, and the Moscow Mendeleev Chemical and Technological Institute. The principal goal of the activity of this UNPK is the training of specialists with a high level of professional and political maturity who possess habits of organizational and managerial activity enabling them to accelerate social and economic development in the USSR.

Additional experience which has been gained with regard to scientific and technical co-operation between higher education and industry in areas of science testify to the major possibilities for widening intergration through the development of different but effective forms of interrelation between higher education institutions and other scientific institutions of the Academy of Sciences of the USSR and industrial ministries and departments. Among these possibilities are the formations of educational-scientific and industrial complexes; scientific and educational engineering centres, interim scientific and technical working groups; and joint scientific research institutions and laboratories — all functioning on the basis of different higher education and academic institutes, themselves focussed on the organization of scientific research and the practical implementation of the most current and prospective scientific elaborations, inventions, and discoveries and the collective use of extremely rare forms of technical equipment.

2.4.1.2. The SEC's

The so-called Scientific and Educational Centres (the SEC's) are another organizational form for the unification of the activities of higher education institutions, industry, and the academic sciences for the training and the retraining of specialists in accordance with the latest trends in scientific and technical development. A SEC is specifically a scientific research and educational centre (complex) which functions according to the principles of shareholding in specific proportions by specific department of given higher educational institutions and of specific institutions of the Academy of Sciences of the USSR. The different scientific-research, design, technological, and industrial organizations of various ministries and departments are allowed to participate in the work of a SEC. The principal goals of a SEC are to carry out fundamental and applied research funded by the state budget in specific areas of responsibility; to train, to retrain, and in general, to raise the professional skills of specialists engaged in the national economy in accordance with its specific orientation; to improve the training of specialists and of scientific and pedagogical personnel in higher education institutions by drawing upon professorial staff and lower ranking teachers, postgraduate students, scientists working for doctorates, and undergraduate students for scientific research carried on by the centre; the use of the technical equipment owned by the centre for study purposes; the development of co-operation with different engineering, technological, and industrial organizations and enterprises aimed at elaborating and producing new kinds of technical equipment, materials, and advanced technologies; and the implementation of the practical results of all of the above in the national economy. The financial resources for these activities are given to higher education institutions and to different departments of academic institutes in order to finance the establishment of contracts between them and various industrial and commercial enterprises and organizations.

As of this writing, 7 SEC's have been established. Their success and the effectiveness of their activities have moved the State Committee for Public Education of the USSR, the Academy of Sciences of the USSR, and some other ministries and departments which were involved with them to organize additional SEC's around several higher education institutions.

2.4.2. The MNTK's

In 1987, higher education institutions began for the first time to organize educational research centres as parts of various intersectorial and interdisciplinary higher education-industry, scientific-technical complexes attached to higher education institutions. Today 54 higher education institutions are participating in the work of 14 such

complexes (abbreviated MNTK from the Russian). The centres which function within an MNTK in fact represent an organizational form of a conglomeration of educational institutions, academic and scientific departments, and scientific-industrial organizations, all carrying out research and implementing its results. They also represent a pooled effort to train specialists in accordance with the main orientation of the particular MNTK.

One of the principal goals of such centres is to reduce the amount of time which must be devoted to the creation, application, and extensive implementation of different highly effective kinds of techniques, technologies, and new materials as well as the timely and thorough training of highly qualified specialists in absolutely new and original orientations of science and its applications.

2.5. Prospects and Goals of Continued *Perestroika*

A new approach to relations between educational institutions and industrial enterprises must be elaborated, one which is based on "contractual commitments providing for the purposeful training and retraining of personnel on a nationally planned basis, with the costs for these purposes to be partially covered by the industries (themselves)". The reimbursement of the costs of training personnel by the industries concerned will release additional funds to be spent for the modernization of studies and the conduct of research at higher education institutions, in particular the financing of capital investments for the building and reconstruction of laboratories, science buildings, centres for industrial training, dormitories, student restaurants, sports installations, and other installations of social and cultural use, as well as the purchase of equipment, technical devices, and computers. The funds in question are spent strictly according to the dispositions of long-term plans.

That the higher education institutions must be compensated by their industrial partner for at least a part of the costs of training specialists is of paramount importance not only as an additional source of revenue for capital investment, but also as a means to induce the heads of different branches of production to think carefully about their anticipated staffing needs, particularly with regard to the most highly qualified specialists, who cost the most to train. A first experience has shown that as a result of the requirement that enterprises must pay for the training of their specialists, a number of departments and other administrative boards have considerably reduced their orders for additional specialists.

Institutions of higher education are becoming more and more involved in the economic life of the country, a process conditioned by the tasks which they must fulfill in order to provide personnel for major national programmes, such as the food and energy and the machine-building programmes. Higher education institutions are also being used to support nation-wide efforts to increase the role of

chemistry in the economy, to support the development, the production, and the use of computers and of automated systems, and to give a broad scope to the consumer goods and service industries. Each programme entails interconnected activities in dozens of industries and organizations that have to be provided with specialists in the relevant fields and with the required levels of training. Proper numbers of specialists must be trained in the time allotted; otherwise plans cannot be fulfilled. These requirements once again confirm the importance of integrating institutes and universities for the rapid socioeconomic development of the country.

Consequently, this new and growing mechanism, which is guaranteeing direct financial links between higher education institutions and industrial production, will influence many aspects of the activities of higher education institutions. Firstly, the new mechanisms will have an impact on the scale and the professional patterns of the training of specialists. Secondly, they will change the quality of training, since as customers, industrial enterprises will have an opportunity to choose partners from among a number of higher education institutions. Thirdly, they will enable institutions of higher education to use their financial and material resources more efficiently, while forcing factories to show an increased concern for the young specialists whom they employ.

As a result of the reforms, higher education institutions will be able to assure an increased quality of training through a combination of fundamental general scientific and professional knowledge and the practical application of this knowledge. The content and the length of given training programmes will vary according to the career plans of students with regard to broad areas of technology, operations, and management. Students showing an interest in and a talent for research will be able to study according to individual curricula and for longer periods than normal. Higher education is entitled by its very nature to develop more rapidly than the economy which is currently being restructured.

3. ORGANIZATIONAL PATTERNS AND MANAGEMENT

3.1. Overview of the Public Education System

A single system of people's education is functioning in the Soviet Union. By constitutional mandate, this system provides for the general educational and professional training of the citizens of the USSR, the moral and physical development of young people, and preparation for employment and social activity.

3.1.1. Basic Principles

The basic principles of people's education in the Soviet Union can be stated as follows:

- equality of all Soviet citizens, irrespective of social and economic status, race, nationality, sex, spoken language, attitude to religion, type of employment, place of residence, etc., with regard to the right to education;
- universal secondary education as well as vocational training for young people;
- public ownership and management of all educational establishments;
- free tuition at all educational establishments; free day-care centres for a certain proportion of the families having pre-school and primary school age children, the costs of which are fully covered by the state, free textbooks in the schools, and state aid to students of all levels by means of stipends and grants;
- freedom of choice among the languages of the Soviet Union of languages of instruction;
- uniformity and continuity of the institutions and the programmes making up the system of public education; easy passage of students, based strictly on academic qualification, from lower to higher stages of education and from one institution to another;
- close links between the education of young people and their preparation for life and insertion into a society through socially useful productive labour;
- the constant improvement of the educational content through application of the latest achievements in science, technology, and culture;

- inculcation of humanitarian principles and high moral standards;
- secular education, uninfluenced by religion;
- co-education.

The Soviet public education system includes pre-school education, general secondary education, vocational technical training, specialized secondary education, higher education, and extra-curricular education, as well as postgraduate course programmes, doctoral courses, and continuing education programmes.

3.1.2. Pre-School Education

Pre-school education is made available through a system of nursery schools and other pre-school establishments numbering 143,000 in 1989. Children are enrolled in these establishments only with the authorization of their parents or their guardians. More than 17 million children have been attending permanent pre-school establishments. In addition, more than 1 million children are accommodated each year in seasonal pre-school establishments.

3.1.3. Compulsory Schooling

Depending on local conditions, one of three kinds of schools may be established: an elementary school (grades 1-3 or 4), an eight-year school (grades 1-8), or a secondary school (grades 1-10 or 11). Today, the preferred type of institution is the three-level general secondary school.

General secondary education is offered by general secondary schools, secondary vocational technical schools, and specialized secondary schools.

A general secondary school (the basic secondary school) is a comprehensive polytechnic institution the mission of which is to provide general secondary education to children and young people. Although the general secondary education programme is uniform, based on common principles with regard to content and level, due regard is taken of the national features of the populations of the Union republics.

The first level of such a school has as its basic goal the formation of the personality of the child and the development of his abilities to communicate and to co-operate, and his desire and will to study. More specifically, pupils learn how to read, to write, to count, and to master the elements of theoretical thinking, culture, speech, and behaviour, as well as the fundamentals of personal hygiene and healthy living.

The second level lays the basis of general education which permits young people to participate harmoniously in the activities of socialist society and to continue the study of particular subjects.

Instruction at this level presupposes the many-sided development of personality, personal inclination, capacity for self-determination, ability to master the fundamentals of scientific knowledge, and acquisition of a materialistic world-outlook (*Weltanschauung*), as well as humanistic and socialistic norms of morality. This level of education presupposes some differentiation in the educational programmes offered in accordance with the personal requests and the inclinations of individual pupils who are permitted a limited range of electives.

The third level of general education completes the general education of pupils on the basis of an extensive differentiation of course programmes, a full accounting of the interests of pupils, and the active participation of the latter in everyday independent activities. Employment-oriented specialties of an elementary nature are also taught at this level.

At the beginning of the 1987-1988 academic year, 45.4 million pupils were enrolled in 135,000 general education schools (15.7 million in grades 1-3, 22.2 million in grades 4-8, and 7.5 million in grades 9-11. The schools employed 3.2 million teachers.

On the completion of an eight-year school programme, pupils are awarded a certificate that authorizes enrollment in the ninth grade of a general education or a vocational or specialized secondary school. The school-leaving certificate awarded to those who complete the programmes of general secondary education schools entitle them to enroll in an institution of higher learning or a vocational or specialized secondary education institution.

3.1.4. General, Specialized, and Vocational Secondary Education

Vocational schools offer the most common means of professional technical training for young people. Enrolling persons with eight or ten years of prior education, they are responsible for turning out skilled workers to meet the requirements of contemporary production and of scientific and technological progress. They must also contribute to the personal development of their students and complete the secondary education of those who have received only incomplete (8-9 years) secondary education.

Vocational training schools usually have two divisions:

- a division for the graduates of so-called incomplete secondary schooling. Students here are trained in professions while at the same time completing their general secondary education. Such division (groups) can be organized, if necessary, as special vocational branches of general secondary schools provided that the latter possess the appropriate resources (the proper specialists and technical equipment);
- a division which trains the graduates of complete general secondary education in complex specialties.

The course programmes of both divisions are organized according to groups of specialities in a way which provides for the broad preparation of their students on the basis of wide general technical and special theoretical knowledge. The terms of study account for the orientation and the level of the working preparation of pupils in general secondary schools.

A still higher level of qualification is provided by the so-called technical lycea, which are undergoing intensive development. They prepare workers in specialities which are particularly complex. Graduates of secondary education institutions who have acquired specializations which coincide with the orientation of given technical lycea are given preference of admission as are those students who have demonstrated creative and original approaches to the solution of technical problems.

The degree to which different types of vocational training programmes are represented in different institutions is in many respects preconditioned by the social demand registered in the territories served by given institutions and by the employment possibilities in given branches of industry. Overall, however, the proportion of workers who having completed general secondary schooling will be trained in technical lycea and in vocational training schools (VTS) is going to grow.

The various kinds of educational institutions and departments which have been mentioned above are established and function as independent units. All of them, however, can be merged into special complexes (under a single name), can function as the educational centres of branches of industry, and can be merged with other educational institutions of different levels, with industrial enterprises, and with other institutions in different scientific-educational and industrial centres.

The graduates of vocational schools have their professional qualifications certified by the award of graduation certificates. Those who successfully complete the programmes of secondary vocational schools receive secondary level professional certificates.

During the 1987-1988 academic year, 4,252,000 students were enrolled in vocational schools.

Specialized secondary schools (technicums and other schools which have been established as specialized secondary schools) are the principal vehicle for the provision of specialized secondary education for young people. Their principal function is the training of mid-level technical personnel having secondary level qualifications. The training programmes offered satisfy the requirements of socio-economic and scientific development and ensure that their graduates have sound knowledge of the fundamentals of the sciences and of economics. Graduates will have undergone classroom instruction and practical training in line with their professional needs and will have learned how to operate computers and to manage production at its primary levels. All those having earned incomplete or complete secondary education credentials may enter specialized secondary

schools, the terms of study of which vary.

The varying demands of the different branches of the national economy for specialists having different kinds of qualifications have given rise to the emergence of three principal types of specialized secondary education institutions:

- technical secondary and polytechnic schools which train mid-level specialists for the sphere of material production: industry, construction, agriculture etc;
- specialized schools which train personnel primarily for the non-industrial sphere: pedagogy, the para-medical fields, cultural and educational activities, art, fluvial and maritime navigation, civil aviation, and certain other fields;
- integrated technical and secondary specialized schools, that is to say, institutions which are integrated with industrial enterprises (associations), organizations, and institutions. They include technical secondary enterprise schools, sovkhos-technical secondary schools, forestry-technical secondary schools, medical institutions;
- medical specialized secondary schools, and the like.

New specialized secondary education institutions are being opened on a regular basis, particularly for the training of non-certified (junior) engineers who have acquired vocational skills in the vocational programmes of incomplete secondary education.

On completion of a course of studies at a specialized secondary school, a graduate will have earned a qualification and have been awarded a graduation certificate that will enable him to enter an institution of higher education.

During the 1987-1988 academic year, the 4,508 specialized secondary schools of the country were training 4,448,000 students. These institutions graduated 1,279,000 students at the end of the academic year in question.

3.1.5. Higher Education

Instructional programmes and individual courses at higher education level are offered by universities, institutes, academies, factory sponsored higher technical institutions, and other institutions of higher learning. These institutions only admit students who have received complete secondary education. Average undergraduate programmes last four to five years and are concluded by the defense of graduation theses following which diplomas, with the qualifications which they certify written on them, are awarded. Instruction is offered by full-time, evening, and correspondence divisions. During the 1987-1988 academic year, 53.2 per cent of the students were being trained in full-time divisions, 11.6 per cent in evening divisions, and 35.2 per cent in correspondence divisions.

3.2. Purpose, Organizational Structure, and Management of the System of Higher Education

3.2.1. Purpose and Goals

The purpose of higher education is to train highly skilled, educated specialists, who have an in-depth knowledge of the theory as well as full mastery of the practical skills needed for practicing their professions. These specialists must be versed in contemporary economic theory and be able to make practical use of scientific achievements. They must participate actively in socio-economic and scientific development, in organization and management, and in socio-political and educational activities. Therefore, higher education institutions have the following tasks:

- the fostering of a responsible and creative approach to studies and labour in students, so as to make them become disciplined, well-organized, cultivated persons who are able to handle socialist property with care and to protect nature;
- the provision of formal education to students and their sensitization with regard to their social duties as well as their rights and obligations as Soviet citizens;
- the provisions of aesthetic as well as physical education;
- a proper blending of all aspects of education so as to ensure that graduates are well-developed mentally and physically, as well as being harmoniously well-rounded from a cultural point of view;
- the conduct of research which, on one hand, improves the training of specialists and promotes socio-economic development and progress in science and technology, and, on the other hand, has practical application with regard to putting results into practice;
- the training of researchers and of teaching staff workers and the perfecting of the qualifications of both categories of personnel;
- the continuing education of graduates.

The graduates of higher education institutions are awarded diplomas which qualify them to continue their studies in postgraduate programmes.

3.3. Types of Institutions

The various higher education institutions of the USSR constitute the basis of the system of higher education of the country. They include universities, engineering and technical institutes, agricultural institutes, institutes of law, medical schools, teacher training institutes, and institutes of art and cinematography. These institutions function according to the *Regulations for Higher Education Establishments* which were endorsed by the Council of Ministers of the

USSR and rules that have been worked out by each individual institution on the basis of these regulations.

3.3.1. Universities

At a time of great progress in science technology, the role and scope of university education is continuing to expand. In 1987, the country's 69 universities were providing training for 583,000 students. Of these, 121,000 were newly enrolled, and more than 91,200 graduated from the universities that year. The universities are primarily responsible for the training of research workers and teachers in the humanities, the natural sciences, psychology, and political economy.

In recent years, more and more university graduates are needed for work in industrial and in agricultural production as well as in the service sector, particularly in the information area. Also, because the system of education is expanding rapidly, there is a growing need for teachers. Although the teacher training institutes were designed to satisfy the need for teachers, the secondary schools give preference to the employment of university graduates because the latter will have been trained to a higher scientific and pedagogical level than graduates of the teacher training institutes. The same is true for specialists in sociology and in psychology.

At the present stage of *perestroika*, university graduates are faced with new tasks of great importance. They are called upon to make use of the most advanced scientific achievements at all levels of the education system. It is necessary to enhance the role of the universities in the training of the personnel who are to be engaged in the social and the natural sciences in the institutes of theoretical and applied sciences. In order to prepare specialists having a profound knowledge of the fundamental natural sciences, the leading universities of the USSR will need to set up special departments and faculties for the training and the retraining of specialists on the basis of research to be employed in industry, in agriculture, and in the public health services. Universities are designed so as to be able to advance the national scientific and technical potential, to contribute to the rapid socio-economic development of individual regions, and to become genuine centres of science and culture.

3.3.2. Engineering and Technical Institutes

The polytechnical, industrial, engineering, transport, and other kinds of engineering and technical institutes also rank among the most important of higher education institutions. In 1987, 2,149,000 students were being trained in 280 institutes of this sort; a total of 483,000 were admitted that year, and 309,000 of them graduated.

The efforts to reform higher education have also been directed

at engineering education. If Soviet industry is to be competitive, the engineering and technical personnel must be capable of introducing radical transformations into technology, of reorganizing production methods, and of increasing the productivity of labour. Therefore new training methods must broaden and deepen the theoretical knowledge of engineers. They will need to master the fundamentals of engineering and of management and to be the recipient of improved practical training through work in production.

3.3.3. Agricultural Institutes

Agricultural workers are trained in more than 100 agricultural institutions, academies, and institutes. These institutions had a total enrollment of 520,300 in 1987. That year, over 107,000 were admitted to agricultural institutions, and 76,000 graduated.

The principal guidelines of *perestroika* stress that the accomplishment of the Food Programme of the USSR hinges on improved agricultural education. Specialists in agriculture will be trained to be able to master the most advanced technologies with regard to horticulture and animal husbandry, taking into account the industrialization of agriculture and agro-industrial integration of production, as well as the adoption of cost-accounting in the state and collective farms.

3.3.4. Economics Institutes

The system of higher education also includes 52 institutes of economics and of engineering economics that provide training for about 336,000 students. Approximately 70,000 entrants were admitted in 1987, and more than 62,00 students graduated from these institutes in 1987. Moreover, economists and engineering economists are trained at the economics and engineering economics faculties of universities and of engineering and technical institutes. The higher institutes of economics train specialists in the economics of socialism. Graduates are able to take specific measures to raise the efficiency of production and the quality of output and to take steps to improve the management of factories and to arrange amalgamations of production procedures and of whole industries.

3.3.5. Institutes of Law

Lawyers are trained at the five institutes of law in the country and in the faculties of law of universities. Nearly 98,000 law students were enrolled in 1987. During the same year, there were 8,000 new enrollees and 16,200 graduating students (however, the latter figure includes the graduates of the university faculties of law). The reform of

higher and specialized secondary education envisages that in addition to the improved general level of juridical training, the graduates of law institutes must be prepared for work in certain specific fields of law. They must have a clear understanding of the development of Soviet society and be able to serve in the legal advice bureaux of industrial enterprises. The profound and wide-ranging knowledge which lawyers must possess must be combined with civic virtue, adherence to principle, incorruptibility, and a commitment to social justice.

3.3.6. Medical Institutes

Medical training is offered in 83 medical institutes throughout the country and in medical faculties at some of the universities. In 1987, the number of students enrolled in medical studies had reached 311,000. That year, 58,000 students enrolled in medical studies, and more than 54,000 graduated. In accordance with the new guidelines, medical education in the future will stress the theoretical and practical training of medical students and the forging of close links between the teaching of the medical and the biological sciences and clinical subjects. One of the most important tasks of medical education is to foster in students, the future physicians of the country, an attitude of civic responsibility and of mercy.

3.3.7. Institutes of Art and Cinematography

The 61 institutes of art and cinematography that are part of the system of higher education provide training for 50,000 students. The annual intake of new students is about 10,000, and the number of graduates per year, 9,000. These institutions are called upon to more fully meet the growing cultural and aesthetic needs of the Soviet people.

3.3.8. Teacher Training Institutes

The teacher training institutes constitute the most numerous group of higher education establishments. More than 912,000 students are enrolled at 200 teacher training institutes, with an annual intake of more than 206,000 and over 139,000 graduating students per year. The reform of higher pedagogical education is aimed at improving the training of future teachers so that the latter will, in turn, raise the level of upbringing and of training of the younger generation and improve the way in which they are prepared for independent living and work.

3.4. Administrative Organs

At present, the higher education institutions of the USSR are subordinated to a number of ministries and departments. For instance, a large number of specialized educational institutions are supervised by corresponding ministries: the Ministry of Public Health, the Ministry of Education, and the Ministry of Railways, to mention three of them. The majority of the higher education institutions are subordinate to the State Committee for Public Education (and to corresponding ministries and departments in the Union republics). As foreseen by the new guidelines, the system of centralized management for the training, the retraining, and the upgrading of the qualifications of specialists will be improved through more democracy with regard to management, and more independence and creative initiatives on the part of individual institutions of higher education. In view of these goals, the State Committee for Public Education is endeavouring to implement a uniform policy with regard to the high quality of specialist training, and the elaboration of a strategy for the development of higher education which takes account of the results of long-term forecasts as to the trends and the rates of development of the productive forces in the country. The Committee will also enhance its role with regard to the scientific guidance of sectoral institutes.

3.4.1. Regional Centres for Higher Education

Along with the enhancement of the role of the State Committee, different public and democratic forms of higher education management (administration) are expected to evolve. Thus 13 regional centres for higher education have been established in the country (in Moscow, Leningrad, Minsk, Kiev, Rostov, Dnepropetrovsk, Chelyabinsk, Tomsk, Penza, Voronezh, Sverdlovsk, Kharkov, and Gomel). The main purpose of these centres is to improve the co-ordination of the activities of higher education institutions in different cities and regions of the country, to facilitate the complex development and the rational use of their potentials, and to solve problems and to accomplish tasks related to economic and social development at different territorial levels.

Given regional higher education centres will, on a contractual basis, link together the higher education institutions of given regions (cities) regardless of the ministries to which they are attached. The centres are to be self-supporting.

The principal task of the regional centres for higher education is the development of common infrastructures through the organization of joint subdivisions for study and scientific research so as to improve the training of specialists, to increase the effectiveness of science as it is taught and practiced in higher education institutions; to improve the conditions of work, everyday life, and leisure; to elaborate new objectives for higher education; and to solve other prob-

lems appropriate for submission to regional higher education institutions.

The main orientations of the activity of the regional centres are established on a democratic basis by the council of rectors of the higher education institutions of a given region. The head of a given centre, who is directly in charge of its administration, is chosen by the council of rectors.

3.4.2. Educational and Methodological Associations

A network of educational and methodological associations has been created and is functioning successfully. Each of the participating associations deals with specific groups of related specialties. Each association draws upon the resources of given higher education institutions which are responsible for the training of specialists in specific domains.

The main tasks of these educational and methodological centres are as follows:

- the shaping of trends in the training and the retraining of certain kinds of specialists;
- the constant improvement of education in accordance with the needs of branches of the national economy and of main tendencies in the development of science, technology, and culture;
- the improvement of the scientific and methodological underpinning of the processes of education, the popularization of progressive teaching methods, the development of the creative thinking and the independence of students, and the intensification of the whole process of study;
- the further integration of education, science, and industrial production;
- the improvement of retraining and the raising of the level of professional skill of the scientific and the pedagogical personnel as well as of other types of specialists;
- the evaluation and the popularization of innovative experience in the domain of education.

The activities of educational and methodological associations are supervised by special councils made up of the rectors and the leading professors of the higher education institutions concerned and of distinguished specialists employed in the national economy.

Such associations have been organized on both sectoral and territorial bases. For example, an association of engineering higher education institutions has been created. Likewise, the higher education institutions of the Moscow area have formed an association. All such associations aim at uniting the efforts of the various participating organizations in the solution of different kinds of problems connected with the activities and the development of higher education institutions.

3.5. Structure and Administration of Higher Education Institutions

The fundamentals of Legislation on Public Education of the USSR and the Union republics lay down common procedures for the organization, the reorganization, and the closing of institutions of higher education by the Council of Ministers of the USSR, irrespective of their ministerial affiliation. The justification for this authority is the need to utilize higher education graduates in intersectoral and interregional industries and establishments, to effect a rational distribution of higher education establishments throughout the country, and recognition that the aforesaid tasks can only be accomplished equitably on an interministerial basis. The subordination of institutions of higher education to different ministries is determined by the Act on the Organization of Higher Education.

3.5.1. Sub-Units of Higher Education Institutions

The most important element in the organizational scheme of higher education is the functional structure of individual institutes and universities. For a higher education institute to function as an independent organizational unit, it is necessary to establish a complex of structural sub-units which perform principal functions, subsidiary units that complement and reinforce these functions, and management links.

Higher education institutions may have branches, faculties, departments, chairs, training and consulting centres, research institutions, laboratories, libraries, clinics, experimental centres, pilot plant study and production workshops, computer centres, printing-offices, cultural recreation centres, and other types of units.

A *branch* is a structural unit of an educational institution which is designed to train students in specialities which are required by the industrial establishments and the other employing organizations to be found in the district in which the given branch is located.

A *faculty* is a structural and administrative unit of a higher education institution, which provides training for undergraduate and postgraduate students and sponsors research in given areas of knowledge and endeavour. A faculty consists of departments (chairs) and laboratories, the activities of which it supervises. Faculties may also set up divisions to provide training in groups of specialities (in cases in which there are great numbers of students and choice of specialities), or full-time, evening, and correspondence departments.

A *department (or chair)* is the basic training and research unit of a branch or a faculty of a higher education institution. It is respon-

sible for teaching the discipline which it represents and the research methods of the latter to students. It is also responsible for the retraining of its teaching staff members and the improvement of their qualifications.

A *training and tutorial centre* is a unit of a higher education institution which provides services and aid to students studying by correspondence.

3.5.2. Governance of Higher Education Institutions

The activities of a higher education institution are guided and supervised by its rector. The election of rectors is a new phenomenon which has come into being as a result of *perestroika* in higher education. Of the 84 rectors which were elected in 1987, 9 are rectors of universities; 28, of technical institutes; 15, of pedagogical institutes; 8, of agricultural institutes; 10, of medical institutes; 7, of economics and law institutes; 5, of institutes of art and culture; and 2, of physical education institutions.

Elections to choose rectors have been held in higher education institutions which are subordinated to 30 ministries and departments in 10 Union republics. The majority of the elected rectors, 51 of them or 60%, head institutions in the Russian Soviet Federative Socialist Republic (RSFSR). A total of 45 of the newly elected rectors are corresponding members of the academies, doctors of science, and professors. Some 39 of them (46.4%) are candidates of science and assistant professors. The statute of elections of rectors of higher education institutions specifies that incumbents will serve for non-renewable five-year terms.

The enlargement of the academic councils of higher education institutions which are charged with the election of rectors has been well received by the academic community, for it favours the further development both of democratization and of *glasnost*.

The pro-(or vice) rectors of an institution are responsible for the direct management of its educational and scientific work. Major educational establishments have pro-rectors for academic affairs, for research, for extension services (correspondence and evening studies departments), and for administration.

Each higher education institution has an executive council which deals with the principal aspects of its activities. Its membership includes the rector who serves as chairman of the council, the pro-rectors, the deans of faculties, the heads of the chairs of the social sciences, of general science, and of the other major disciplines taught in a given institute or university, and representatives of professors and other teachers as well as of students. The council will also include leading scientists and specialists drawn from factories, public organizations, and other kinds of establishments that share common interests, for instance, with regard to research and production, with given higher education institutions.

Each faculty has a council consisting of the dean who serves as chairman, assistant deans, heads of chairs, and members of student organizations. These councils may also include specialists from factories and other types of organizations and offices the activities of which are connected to the faculty.

The dean, as the head of a faculty, is elected by the secret vote of its faculty council from among its professors and its most experienced assistant professors according to procedures which have been established by the State Committee for Public Education of the USSR. The dean of a faculty oversees the instructional work and the research undertaken in his faculty. He is responsible for seeing to it that the curriculum is covered and that students make normal progress in their studies, for fixing the dates of examinations, for supervising the procedures by which students are promoted at the end of each academic year, and for awarding stipends to students, taking into account the recommendations of student organizations. Assistant deans are appointed by the rector on the recommendations of the dean.

Additionally, higher education institutions have "informal" administrative organs which have not been the objects of legislation. These include the so-called rectors' offices (made up of the rector and the pro-rectors of given institutions) and the so-called deans' offices (made up of the deans and the assistant deans of given faculties). These offices participate in the administration of institutions of higher education, not as groups of officials, but as specific bodies with enumerated powers.

Apart from the main administrative bodies described above, institutes and universities have other administrative bodies. These are engaged in such activities as general management, planning, finance and financial control, accounting, personnel matters, patents, labour protection, business correspondence, etc.

The administration of higher education institutions will be improved, in accordance with the "Guidelines", through an extension of the rights and the responsibilities of the institutions themselves and of their governing and administration organs. The personnel will be enhanced. The responsibilities of deans' offices will be increased. Departments (chairs) will be given increased responsibility for raising the quality of instruction.

4. SELECTION OF STUDENTS AND COMPOSITION OF STUDENT CONTINGENTS

All citizens of the Soviet Union who have completed secondary education, regardless of the types of institution attended, have the right to apply for admission to higher education institutions. Aliens and stateless persons who reside in the USSR have the same rights in this respect as do Soviet citizens.

4.1. Recruitment Methods

New contingents of students are recruited through a system of career guidance and selected for the most part by means of competitive examinations.

Career-guidance consists of the spreading of information among young people about available course offerings in given institutions of higher education, about the careers linked to the specialties in question and conditions of employment, about entrance examinations, and the provision of other types of information, all of which help young people choose professions according to their wishes and inclinations. To improve career guidance, measures are being taken by the secondary and the higher education institutions, the factories, the public organizations, and state offices of the country.

Annual reference books for those wishing to enter higher education list institutions by name, giving their branches and faculties, admission requirements, the schedules of entrance examinations, and the listing of course programmes available. In addition, useful information can also be found in booklets published by individual institutes and universities, and in the announcements about admission to higher education institutions that are regularly published in the press or broadcast over the radio or the television. Also, certain books written by prominent specialists, heroes, and veterans of labour, who discuss their work, are helpful for career guidance. Many higher education institutions have set up temporary or permanent tutorial centres for entrants and hold open houses during which future students may familiarize themselves with the teaching staffs, the laboratories, and the conditions of life and work of the institutions in question. Career-guidance schemes, which begin by disseminating information, in fact serve as the first step in the selection process and

as a means to prepare applicants for entry into higher education. Institutes and universities have consequently established links with secondary, vocational, and specialized secondary schools, as well as with industrial enterprises and have organized schooling in certain professions. Some of these institutions have set up "smaller faculties", the students of which, in addition to acquainting themselves with the institutions of higher education in question and their specialties, can attend sponsored lectures in specific fields of knowledge and take part in creative work in those areas of science and technology in which they are particularly interested.

The competitions organized by higher education institutions in certain disciplines for school-children are an important form of career guidance. The winners are invited to attend classes in mathematics, physics, chemistry, etc., in the sponsoring institutes and universities. Here they acquire additional or more intense training in those domains covered by the competitions in which they were successful.

Institutions of higher education may also have preparatory departments which offer training programmes of eight to ten months. The most successful of the enrollees in these departments are admitted to higher education without having to pass an entrance examination.

In the last few years, so-called educational complexes have come into being. Intended as a means to popularize higher education among young people, they consist of co-operation links between given higher education institutions and secondary schools by means of which some of the subjects in the latter institutions are taught by faculty members drawn from the former. Complexes of this kind have been created at the Moscow Institute of National Economy and the Moscow Institute for Engineers of Water Transport.

Applicants are admitted competitively to institutes and universities on the basis of their performance on entrance examinations. In order to ensure a common approach, rules of admission, applicable throughout the Soviet Union, are published annually. These determine the procedures for entrance examinations, the terms of admission in connection with certain specialties and forms of education (full-time, evening, or extra-mural), privileges for certain categories of applicants, special requirements in the cases of a number of specialties (medical studies, for instance), and the necessary forms to be filled.

In accordance with these Rules of Admission, an admission commission has been set up in each higher education institution. These commissions grant admission to the most capable and well trained applicants on the basis of interviews and the results of entrance examinations. The admission commissions, 50 per cent of the members of which must be renewed each year, are made up of the most senior teaching staff members of given institutions. They are in-house units which recruit members from other institutions. The membership must be approved by an order issued by the rector of the higher education institution in question.

An admission commission is usually headed by a department head or an assistant professor. His duties include the appointment of experienced examiners, the organization prior to the entrance examinations of tutorials for applicants, and the formulation of examination procedures and common assessment criteria. He is also expected to see to it that the proper number of examination papers are prepared, to control the actual examination procedures, and to sum up the results of the examinations.

The Rules of Admission provide for special conditions of admission for certain categories of applicants. The latter include persons who have had some years of employment or who would like to be trained in specialities that are in high demand in certain regions of the country. The principles of social justice require special treatment for certain groups of applicants.

Some categories of applicants are exempted from entrance examinations: those, to begin with, who have completed course programmes at preparatory departments and have passed graduation examinations. These departments enroll persons who having graduated from secondary schools have become superior workers and collective farmers. They also take in army veterans. Young people are recommended for admission to those departments by social organizations and by the managers of factories, construction projects, transport and communication organizations, state and collective farms, as well as by the commanding officers of army units. The same conditions of admission apply to servicemen transferred to the reserve owing to reductions in staff, health conditions, or length of service (as in the cases of officers, warrant officers, and those staying on as re-enlisted men), to the graduates of higher military training institutions, as well as to students in military training establishments who have been transferred for reasons of health to the reserve. No entrance examinations are required for teachers, instructors, and skilled craftsmen responsible for industrial training who, having received specialized secondary education, have been employed in their respective specialities. These and certain other categories of candidates including certain categories of young people only need to be interviewed.

Higher agricultural establishments, as a rule, admit persons residing permanently in rural areas who demonstrate an interest in and an inclination for work in agriculture.

Higher medical institutes for the most part enroll junior or mid-level medical personnel with at least two years of work experience, graduates of para-medical secondary schools, who are entitled to enter a higher medical institute, as well as people from rural areas who are sent for training at higher medical institutions by regional public health departments. In recent years, serious attention has been given to making objective assessments of the knowledge of applicants with the help of the psychological and pedagogical sciences and of computers.

4.2. Recruitment Results in 1987

In 1987, the higher education institutions of the USSR received a total of 1,288,000 applications for regular daytime course programmes. This figure represents 59,100 more applications than in 1986. The rate of competition in 1987 was 198.6 requests for each 100 vacant places (in 1986 the rate was 190.1 to 100). The number of applications to industrial higher education institutions and to teacher training institutes had also increased in 1987 by 20,000 and by 13,000 respectively as compared to the figures for 1986.

In 1987, 651,300 students enrolled in the day divisions of higher education institutions following success in the entrance examinations. Of these, 51,800 (7.9%) were graduates of the preparatory departments of the institutes in which they enrolled. Some 437,300 entrants who did not resign from their employment were admitted to higher education. Of the latter group, 131,700 were admitted to evening divisions and 315,800 to correspondence studies. In 1987, 11.4% more employed students than in 1986 were admitted to higher education — all having been sent by various kinds of enterprises, organs of public education, and trade unions.

In 1987, 70.1% of the first year students in higher education institutions had completed general secondary education; 23.3% had graduated from secondary specialized educational institutions, and 6.3% had graduated from secondary vocational training schools. The largest proportion of the first year students (89,000), enrolled in day divisions, were graduates of different types of secondary schools. The breakdown of higher education graduates for 1987 according to type of division (day, evening, or extra-mural) was as follows: 70.8%, 34.7%, and 12.3% respectively. Clearly the most popular way of attending a higher education institution in the USSR is via day studies. A majority of the new enrollees in the day division of higher education institutions (64.3%) are students who have just completed their secondary education. Such students make up almost a quarter of the first year students in the evening divisions and 4.2% of those in the extra-mural departments of higher education institutions.

Of the new enrollees in the day divisions of higher education institutions 89,500 are secondary school medal winners or graduates with first class honours (12.7%) of specialized secondary and vocational training schools.

4.3. Composition of the Student Contingent

The social structure of the student contingent in the Soviet Union is basically similar to that of society at large, a characteristic which proves that the principle of equality of opportunity in education is respected. The fact that the global enrollment in higher education is made up 55 percent of women and 45 percent of men proves that there is no sex discrimination. The proportion of students to the

total population of the USSR is 185 to 10,000. The figure varies from 118 to 206 for the individual Union republics. What is notable, however, is that some of the republics on the territories of which not a single higher education institution could be found prior to the Great October Revolution, have now reached the same number of students per 10,000 of the population as is characteristic of many of the developed western countries. Nothing better illustrates the role of Soviet higher education than the way it has raised the educational levels of the different nationalities populating the Soviet Union.

For the future, the student contingent is expected to grow; however, its composition in terms of specializations represented will reflect the structural changes in the economy, which are occurring. Students will be trained in only a limited number of specialties, ones linked primarily with the complex social and cultural needs of society and, secondly, with the most advanced fields of science and technology: electronics, documentation science, cybernetics, robotics, biotechnology, etc. taken as a whole, the scale of specialist training as set against the background of intensive economic development will not vary to any significant extent from the current level for the next 10 to 15 years.

5. THE INSTRUCTIONAL AND LEARNING PROCESSES

5.1. Goals and Principles

The contents, the forms, and the methods of training which are conditioned by the new exacting demands which are being placed upon young specialists today serve as indices of the received efficiency of higher education. Graduates must have received a solid grounding in the fundamentals of their chosen disciplines; they must be familiar with the latest thinking with regard to economics and be able to cope successfully with the problems of management, including the organization and the education of workers; they must know how to use computers in their work, and to speak foreign languages; they must be people of culture, who can take the initiative in their working environments and demonstrate a sense of responsibility. Finally, they must be willing to refresh and to enrich their knowledge, be willing and able to take bold decisions, and to act rapidly on the latter.

In order to foster such qualities in students, the higher education institutions of the Soviet Union are shifting their training emphases to the broad-based education of specialists who combine in-depth knowledge with thorough practical training in specific fields of activity. Given this goal, great care must be taken with regard to the determination of the organization, the content, and the forms of educational and training activities. Thus, great efforts have been made to overcome narrow departmental and disciplinary approaches to the formation of the categories of specialists who are trained in higher education institutions. The idea is to eliminate whatever contributes to narrowness so that specialist training will impart fundamental knowledge of a kind which can be combined with basic practical training in the specific requirements of a branch of industry.

The following principles have been established with regard to the training of specialists:

- The varieties of qualification types must correspond to the functional and technological structure of the social division of labour in the USSR;
- The list of specialties must suit the needs of all the branches of the national economy;
- Only broad specialization programmes should be offered; duplications of programmes should be eliminated;
- The planning required for the setting up of new specialist training programmes must conform to the main orientations

of *perestroika* as applied to the organizational and economic relations of higher education with the branches of the national economy;

- The various course programme offerings should be standardized throughout the whole country;
- The shift from the previous list of course programmes and the current list of specialties should be smooth.

The new list of specialties has 300 entries. The considerable reduction in their number as compared to the previous listing was accomplished through a process of integration and elimination. For instance, the speciality known as "the instrument making industry" is composed in part of two former specialties: "instruments of precise mechanics" and "cinematographic equipment". A speciality known as "locomotives" has been elaborated on the basis of such specialties as "locomotive-building", "the technology of transport machine-building and repair the rolling stock", and "diesel-locomotives and the diesel-locomotive industry". More than 30 specialties have been modified in this fashion.

The content of the various course programmes is based both on the professional characteristics required of the specialists in question and what are perceived to be, in All-Union standard documents, the requirements posed by the economy and by society with regard to the basic knowledge, skills, and abilities of different kinds of specialists. These qualification characteristics determine the elaboration of curricula and syllabi in each speciality.

5.2. Examples of Curricula and of the Subjects Composing Them

Curricula are standard documents, valid throughout the Soviet Union, that specify the content and the sequence of each course programme for the training of each kind of specialist. They specify the amount of time allocated for groups of individual subjects, for individual projects, for the different types of classes (lectures, seminars, laboratory work, practical work, etc.), and the numbers of tests, examinations, and practical evaluations required. The curricula also determine the order in which subjects are taught and their grouping into various categories: general education subjects, general professional subjects, and specific subjects.

General education subjects acquaint students with the broad areas and the fundamental themes of the social and natural sciences and the humanities and teach them how to use their knowledge. These subjects appear in curricula before general and specific subjects linked to future professions because they lay the basis for mastery of more concrete and specialized subjects. As general subjects, the social sciences have a major role to play as they are used to shape the scientific world view of students and to help them master both the laws governing social development and those regulating natural and

historical processes. Students in all types of higher education institutions, regardless of speciality, must study these subjects. Subjects covering the fundamental sciences are designed to accomplish two interrelated tasks, first, to equip specialists with a knowledge of the basic laws of the natural and the social environments in which they are going to work, and second, to give them the basis for that scientific thinking which is necessary for the study of the general and specific subjects linked to professional practice. Thus the fundamental sciences lay the theoretical foundations for advanced professional training, and the contents of the subjects in question remain more or less stable.

General professional subjects are designed to introduce students to their future specialities. The syllabi of these subjects are designed to meet the requirements of specialized training and to provide a high degree of professional mobility for specialists in the spheres in which they are engaged, for the range and the level of general training determine, to a considerable extent, the versatility of graduates. Examples of general subjects in engineering include strength of materials and machine elements.

The so-called special subjects in higher education course programmes are the ones which are the most subject to change. As these subjects are designed to facilitate the integration of new graduates into their work environments, they must be constantly adapted to the needs of the factories and the offices in which graduates will work.

An important part of the *perestroika* of higher education is linked to the raising of the standards of the social sciences which are a part of all course programmes. The aim is to increase the humanization of education through the teaching of ethics, aesthetics, scientific communism, logic, and the history of philosophy, and of world and national cultures.

In universities, in teacher training institutes, and in art institutes, a total of 36 hours of classroom time are devoted to the teaching of ethics, of art, and of culture. An examination or a special test at the end of the course is also required. Other types of institutions offer the subject on an optional basis. The humanities programmes in higher education institutions require 72 hours of classroom instruction in aesthetics and an examination in the subject. The faculties of natural sciences at the universities and the teacher training institutes require only 36 hours. In the case of other types of programmes in all other kinds of higher education institutions, the 36 hour programmes in aesthetics are optional.

Other required and optional subjects include the following: 24 hours of scientific atheism in all undergraduate programmes in all higher education institutions and 36-72 hours of history of philosophy and 56 hours of logic in the humanities faculties. A course in the history of world and national cultures is offered in all higher education institutions. The decision as to whether this course should be compulsory or optional is made by the Council of the given higher education institutions.

Up to 15% of the available instructional hours are left to the discretion of the individual institutions themselves. They are expected to allocate them in accordance with the wishes of future employers who have "ordered" graduates having specific types of qualifications. All higher education institutions have the right to establish their own class schedules, to set the periodicity and the duration of examination sessions and terms, to move the study of certain subjects from one study period to another on the condition that there be a clear methodological interrelation between them; to change up to 10% of the amount of time devoted to certain subjects as set by the model curricula; to set the load of certain separate kinds of classes within the limits of the general instructional load; and to schedule extra classes aimed at raising the cultural and educational levels of students. In addition, higher education institutions are entitled to meet the requirements of certain research and design establishments by increasing the intensity of training programmes and by lengthening them by one year.

Model curricula serve an important function with regard to the organization of training in higher education institutions, for they determine the basic content of course programmes. Model curricula are elaborated by higher education institutions themselves and then confirmed by the State Committee for Public Education of the USSR and by the ministries and departments involved. They must be directly approved, in the cases of institutions which are subordinated to specialized ministries and departments, by the ministries and departments in question.

As curricula and syllabi both reflect and determine the general trends in the training of students, and their quality reflects, to a considerable degree, the level of training, large numbers of professionals representing both academic and other types of research institutions, as well as factories, ministries, and departments participate in their planning.

5.3. Instructional Methods

So far as the instructional methods used in Soviet higher education are concerned, a clear need exists to radically change the structure of the teaching process as it has evolved over many years. The sheer number of classes will be reduced, particularly traditional lecture courses. These will be replaced by guided independent study, increased amounts of practical work to be undertaken in laboratories, and active forms of study, term papers, and graduation projects with current economic problems. Some classes will be transferred to the factory floor. Competitiveness in studies will be at the basis of a new type of training. More demands will be placed on the quality of the knowledge of students who, at the same time, will be given better opportunities to reveal and to develop their talents and abilities. These goals will be achieved through comprehensive measures including more rigid requirements with regard to performance in examina-

tions, the dismissal of students who are incapable of studying or unwilling to do so, and special opportunities for gifted students, particularly through individualized programmes of study.

5.4. Evaluation of Student Performance

The evaluation of the performance of students, an integral part of the educational process, is designed so that the progress of the latter in mastering the subjects included in the curricula are monitored closely and objectively. The rectors' and the deans' offices are responsible for organizing effective systems of evaluation.

Generally speaking, three ways of evaluating student progress are employed in higher education institutions in the Soviet Union: operative (on-the-spot), current, and final. The first of these is a form of daily evaluation which occurs in classes. It is designed to indicate how well students can cope with specific assignments by requiring them to answer questions and to take machine-readable tests. The results of such evaluations are used by departments (chairs) to identify students who are lagging in their studies and to help them catch up. They can also be used as a justification for organizing individual programmes for very capable students. A current evaluation is intended to assess knowledge of a specific theme or section of a given subject. It can be made up of tests, essays, reports, tutorials, etc. This kind of evaluation is particularly necessary in lower level courses for students who have not yet adapted to the teaching methods of higher education. Finally, there are tests, examinations, the defense of term and graduation papers, and state examinations, all of which permit a thorough evaluation both of the knowledge and skills gained by students in given subjects and of individual curricula. Moreover, this type of evaluation facilitates an objective assessment of the theoretical and professional levels of training which graduates have achieved and the extent to which their qualifications permit them to undertake practical work.

The number of tests and examinations to be taken during each examination session is determined by the curricula. Student performance on tests is assessed as "passed" or "not passed", and on examinations as "excellent", "good", "satisfactory", or "unsatisfactory". Students who have accumulated failures at the start of a new academic year are dismissed from their higher education institutions.

The respective chairs and departments of higher education institutions ensure an objective and uniform approach to examinations, taking into account the place of a given subject in the total curriculum and its importance with regard to the education of students as future specialists.

A special significance is attached to such forms of evaluation as term papers and graduation projects as well as the final state examinations. The themes of year-long term papers are normally suggested by the chairs, but students can also suggest their own themes. Each

year the themes of those papers become increasingly complicated. The senior year papers are devoted to research and must be connected with practical work. They are to be defended either before commissions appointed by given chairs or by all the members of the chairs. Graduation projects (works) are prepared and defended by students who have reached the final stages of their training. The defenses sum up the entire course of training of future specialists and reflect the results of original research on academic or practical problems that are of interest to research institutions or to specific industries. Students are required to present the plans of the work they intend to do in order to solve the problems which they will tackle in their graduation theses (projects), problems that can be either of a theoretical or of a practical nature. They must identify the most effective methods for achieving their aims, conducting experiments, and evaluating the results. They must conclude their work by describing in an appropriate written form what they have done and the results obtained. Graduation works are defended at given institutions of higher learning, factories, or other types of organizations. The graduating students must report on the results of their efforts, and react to observations made by the members of the given state examination commission. The assessment of graduation works takes into account their theoretical, scientific, and ideological levels as well as the quality of experiments, calculations, and blueprints.

The final state examinations are also very important parts of the higher education process in the Soviet Union. These provide a comprehensive evaluation of the level of training and the extent to which the knowledge and the skills of specialists conform to the qualifications required.

State examinations are held by state examination commissions which have been established at all institutions of higher education. Each commission includes a chairman appointed by the supervising ministry or department and other members who have been appointed by the rector of the given institution. The commissions also include among their members the rector of the given institution or one of the pro-rectors responsible for training or research, the dean of the relevant faculty, the heads of chairs, professors, or assistant professors drawn from the chairs of social science and from the chairs which cover the general scientific and engineering subjects covered by the examination in question, and representatives of given productive organizations. These commissions may also include teachers and professors from other educational and research establishments and specialists employed in the respective industries.

The state examination commissions are entitled to evaluate the scientific, theoretical, ideological, political, and practical education of students; to decide whether they are fit to receive relevant credentials and graduation certifications (with, or without honours); and to suggest ways of improving the quality of the training offered by higher education institutions.

5.5. Need to Link Teaching and Research

The most essential problems linked to the advancement of higher education and the radical improvement of the quality of training posed by the *perestroika* guidelines can only be solved if the training and research activities undertaken in higher education institutions are closely interrelated, for the development of new knowledge is at the basis of higher education. The proper training of specialists can only be accomplished if based on the results of research so as to meet the requirements of rapid progress in science and technology and to be able to plan new curricula and syllabi, to prepare new courses of lectures, to write new textbooks and manuals compatible with contemporary demands, and to use computers on a large scale in the training process.

6. HIGHER EDUCATION AND RESEARCH

A considerable proportion of the scientific potential of the USSR is assured by the higher education system. It employs about half of the teachers and researches in the country who have been awarded degrees and titles. The higher education system boasts a well-established network of institutions devoted to research including research institutes, basic and applied-research laboratories, astronomical observations, and botanical gardens.

At present, many higher education institutions are in fact major centres of science. They are involved in tackling major research and technological problems that are part of the national economic plans of the Academy of Sciences of the USSR and the State Committee for Science and Technology. For these reasons, and because it is a component of the national research complex, this aspect of the activity of higher education institutions is relatively independent. Research activities are organized according to current requirements for the training of specialists, thus enriching the process both of training and of research.

6.1. Sponsorship and Financing of Research

Research activities are organized along two lines in accordance with the sources of funding for higher education. They may be subsidized by the state budget or carried out on a contractual basis. The research projects, which are covered by the state budget and comprise an essential part of the research activities of higher education institutions and of their scientific bodies, involve almost all of the teaching staff members. The principal object of these projects is to tackle fundamental scientific problems as well as the most pressing sectoral research and technical and economic problems in different fields. Research undertaken on a contractual basis is limited, for the most part, to problems of application. It is aimed at dealing with specific problems of management and production. Contractual research projects, which serve to consolidate links between higher education and production, have a positive effect on the quality of training. The persons involved in them: the professional and the teaching staffs as well as postgraduate and undergraduate students receive wage bonuses and stipends, which may raise their total salaries by 50%, for the accomplishment of different kinds of contractual work.

6.2. Specific Achievements in Research

Institutions of higher education have been at the forefront with regard to the solution of certain problems of fundamental research. University researchers are successfully developing schools of scientific thought that are widely known today in mathematics, physics, chemistry, biology, mechanics, and astronomy, to mention a few disciplines. Researchers attached to Soviet higher education institutions have done a great deal with regard to the exploration of space, the development of atomic energy and of up-to-date radio electronics, cybernetics, computer technology, and other leading areas and fields of science and technology.

University researchers have made important contributions to the theory of numbers, to algebra and to mathematical logic, to the theory of differential equations, to functional analysis, and to the theory of probability. Physicists employed by higher education institutions developed the theory of nonlinear coherent optics and the quantum theory of synchronous radiation that served as a basis for the discovery of the self-polarization effect of electron radiation. Researchers attached to the P. K. Shternberg Institute of Astronomy of Lomonosov University in Moscow evolved the high-precision analytical theory of the movement of artificial satellites of the Earth that can be used to study the movement of the satellites of other planets. Researchers at the Radio Physics Institute of the University of Gorky, along with their counterparts at the Astrophysical Observatory at the USSR Academy of Sciences located in the Crimea made the first measurements ever of the intensity of the radio emissions from the visible side of Venus. Scientists from a number of higher education institutions have carried out extensive research in such new promising fields in biology as bio-energetics and the conservationist theory of the origin of life on Earth.

A number of world-class achievements in technology can be attributed to the scientific departments of higher education institutions. For instance, the Bauman University of Technology has developed a new method for the grafting and the cutting of biological tissues. The Institute of Aviation in Kharkov has designed impulse cutting facilities for use in continuous metal casting and in swarf briquetting. Important research has been conducted by the Moscow Institute of Energetics with regard to the design of electric power transmission lines of increased capacity, electric machine engineering, and electric transmissions. The Polytechnic Institute of Byelorussia is a leader in research on powder metallurgy.

Agricultural institutes study ways to intensify agricultural production on the basis of agro-industrial integration and specialization, intensive technologies, the wide use of up-to-date machinery, and the latest achievements in biological and chemical sciences. A good model in this respect is the activity of the Institute for the Mechanization and the Electrification of Agriculture in Chelyabinsk. This institution owns a large highly profitable estate, with considerable areas of arable land, 5,000 head of cattle, and breeding facilities. The estate

produces and delivers large quantities of products to the state, and it provides the state and the collective farms of the region with pedigreed calves and selected seed for wheat and other crops. The individual farms making up the domain have their own training and research centres and control and measurement services. This solid base for experimentation facilitates large scale research the results of which are put to use on a contractual basis with agricultural management bodies and through direct contacts with state and collective farms.

In the Georgian SSR, current problems of the national economy are solved by the Polytechnical Institute which has carried out studies in the Kolkhida Valley on the efficient utilization of the Republic's natural resources and on the protection of the environment.

The higher education institutions of the Turkmen SSR are conducting a great deal of research on such matters as possible ways of using solar energy in production and in everyday life, ways of developing the oil and gas deposits of the Republic in a rational manner, and geological prospecting.

Research which is being conducted by the higher education institutions of Siberia and of the Soviet Far East is particularly vital for the development of the eastern regions of the country. For instance, the University of Tyumen has been active in tackling the tasks facing West-Siberian territorial production complex. Its research programme deals with the natural resources of the Middle Ob Region, the Khanty-Mansiisk Autonomous Region, the Jamal Semi-Peninsula, and the northern and Polar Urals.

The higher education institutions of Irkutsk are engaged in large-scale research aimed at developing the economy of eastern Siberia. Thus, microbiological ways of preserving flora are being studied at the state university. A great deal of research is being devoted to ways of making rational use of Lake Baikal. University scientists and production specialists are carrying out extensive studies within the framework of the comprehensive contract on scientific and technical co-operation linking the University of Irkutsk and the Angarsk-oilorgsynthesis Production Association.

Major economic problems in the Khabarovsk Territory of the Soviet Far East are being solved by the institutions of higher education. The Polytechnic Institute is investigating problems of economic development in the Soviet Far East, and in particular, those with regard to the eastern section of the Baikal-Amur railway. Along with the Far-Eastern Research Institute of Forestry, the Polytechnic Institute is carrying out joint studies into ways of using systems of machines for the initial processing of timber. In addition, its researchers have elaborated methods for determining priorities in the building of highways in the region.

The Medical Institute of Khabarovsk is conducting research into the problems of adaptability of builders to natural conditions along the eastern section of the Baikal-Amur railway and is working out measures to prevent the outbreak of certain diseases both among newcomers and among the indigenous peoples of the region.

6.3. Research as an Integral Part of Course Programmes

With regard to the expanding contribution of science, as vehi-
cled by higher education, to the national economy, the point that
should be made is that higher education serves to raise the scientific
level of all aspects of the training offered by the institutions in ques-
tion. The expansion of research activities in higher education institu-
tions improves the qualifications of teachers and professors and the
quality of training. As these activities increasingly become integral
parts of training programmes, they will draw increasing numbers of
students into research and technical activities.

Several possibilities exist for drawing students into research
projects. The fundamentals of research can be included in the re-
quired laboratory work components of course programmes. They
can also be inculcated through the assignment of term papers and
other kinds of projects, and the preparation of research papers and
synopses in social, scientific, general, and special subjects. Finally,
research is required for the production of graduation projects.

The participation of students in various kinds of research pro-
jects as a part of their training helps them develop initiative, a cre-
ative approach, and the ability to work independently. The introduc-
tion of new elements of research into training is linked in many ways
to the introduction of new forms of student research activities. The
most popular of these have proved to be the establishment of student
research groups which today can be found in every department in
every higher education institution.

Students may also have research projects assigned to them by
their design centres, by technological and economics bureaux, or by
computer centres — all organizations which are busy developing pro-
jects of practical importance. The design centres are elaborating a
great number of new and increasingly advanced construction pro-
jects, instruments, equipment, technological processes, and feasi-
bility studies.

One example which can be cited of student research work is that
organized by the Moscow Aviation Institute (MAI) in which complex
measures have been taken to combine research with training. All the
course programmes include the subject known as Student Study and
Research. Moreover, all the elements of research are introduced at
all levels of training through practical classes and laboratory re-
search, term papers and projects, and practical work. The purpose of
research is to instill habits of independent creative work in students
and the ability to use their skills so as to master the classroom in-
struction which they have received and to produce a practical result.
The research projects undertaken by students are sponsored by their
departments and by student design bureaux.

Most student graduation projects are planned on the basis of the
research which is being conducted by the respective chairs. They
may use the laboratory equipment of the chairs under the supervi-
sion of the research workers of the institute.

More than 90 per cent of the students are involved in different kinds of research and technical activities, and over 30 of the student design and research bureaux are open to the students of MAI. Members of the bureaux can participate in the entire cycle of the design and the construction of new technology, from blueprints to metal structures.

Over 1,200 students took part in the building of "the Quantum", an experimental sports airplane which was used to set several world records. It represents one of the most remarkable student achievements at MAI. Students made the drawings and designed the components of the airplane as a part of their studies. They helped in its construction and later helped to assemble it. Dozens of graduation projects and about hundred term papers were written and defended in the process of developing this airplane.

Another example of how student research is organized is that of the Lomonosov Institute of Precision Chemical Technology in Moscow. This institute boasts a well-established system of student research activity that is known as the Student Research Complex. Future specialists are drawn into research activities from the start of the first year at the institute. Thus they are enabled to acquire in-depth knowledge in the areas covered by the relevant courses and to develop creative approaches to work.

6.4. Student Research Competitions and Membership in Professional Societies

During their junior years, students take part in contests which are held in different subjects included in the curricula. They must solve problems containing elements of research and present their solutions clearly. Also a student scientific society functions as part of the system, the results of its activity being summed up at annual scientific conferences. Senior year students have the widest opportunities for research. As a rule, they are involved in the planned research of departments, both that covered by the state budget and that financed through contracts. That these research arrangements are satisfactory is proved by the fact that 90 per cent of the resulting innovations are introduced into production.

The ways in which students participate in research have become extremely varied. One result has been the development at the Djam-bul Hydromeliorative Building Institute of a system of targeted student participation in contractual research. Students begin their involvement during their first year of study and remain involved, under the supervision of the same teacher, until they graduate.

The growth of student participation in research and in technological development, and their ability to design projects of a high scientific and practical level are stimulated by the system of awards for scientific achievement.

As a result of the annual All-Union Competition for the Best Research, 300 students receive awards for superior results in theoretic-

cal and applied research in different branches of the natural and the technical sciences and in the humanities. The awards are medals which are issued by the USSR Council of Ministers. In addition, about 1,000 students annually are conferred the title of *laureate* by the State Committee of the Young Communist League (YCL). Medals and prizes are also awarded to students by the USSR Academy of Sciences, the Academies of Pedagogical and Medical Sciences and the USSR "Lenin" Academy of Agricultural Sciences for outstanding research. Over 6,000 students annually are awarded medals and prizes by the ministries of the various republics which supervise education and the academies of sciences. Exhibitions of student achievements in science and technology have become a tradition at the USSR Exhibition on Economic Achievements.

Every two years a competition for student papers in the social sciences is organized. It constitutes the most popular and the most wide-ranging review of Soviet student achievement in the social sciences. The winners are awarded diplomas by the State Committee for Public Education and the YCL Central Committee.

6.5. Research through the Earning of Advanced Degrees

The high level of scientific research achieved in certain higher education institutions in the Soviet Union is the result of their being training centres for the teaching and research personnel with the highest qualifications: holders of candidates and of doctors in science degrees. The postgraduate course programmes which are offered by institutions of higher education enroll 60 per cent of the total number of postgraduate students in the USSR. In order to improve the training of research and teaching personnel, full time postgraduate training in higher education institutions will be expanded. The most capable of young people will be selected to enroll in these courses, priority being given to those who have gained a certain experience in their respective fields. Those successfully completing the courses are qualified as research workers. A three-year doctorate course has been established as the highest stage in the system of continuous education in the country. It is offered at major institutions of higher learning and at research institutions and offices.

6.6. The Future of Research in Higher Education Institutions

The guidelines for the reform of higher and specialized secondary education envisage that the contribution development of the USSR will intensify. Thus as individual institutions expand their commitment to research and development, the role they play in the national economy will grow correspondingly. The volume of fundamental research will increase by a factor of two or three, and design, technological, and experimental research, by a factor of four. Re-

search, design, and experimental work conducted by institutes and universities on the basis of contracts with industries and other kinds of enterprises will be more efficiently organized than in the past. These activities will be devoted to the resolution of large-scale socioeconomic, scientific, and technical problems on the basis of long-term comprehensive contracts between management bodies, higher education institutions, and ministries, as well as between higher education institutions, production associations, and individual factories. Although state budgetary allocations will be increased so as to increase the amount of fundamental research, much of the funding for it will have to be obtained from the proceeds of contractual work. Steps are being taken to bring the research activities of higher education, the academies, and industry closer together.

7. POSTGRADUATE COURSE PROGRAMMES, THE RECRUITMENT AND PROMOTION OF NEW STAFF MEMBERS, AND CONTINUING EDUCATION

7.1. Postgraduate Degrees

The teachers and professors who work in higher education institutions are distinguished by their high academic qualifications. Throughout the country, 50 per cent of the teaching staff members have advanced degrees. There are 20,000 holders of doctorates of science and 220,000 holders of candidate of science degrees. According to Soviet law, the candidate of science and the doctor of science degrees are scientific advanced academic degrees. According to the requirements set by the Supreme Certification Commission (SCC), the candidate of science degree is equivalent to the Ph.D. as awarded by universities in the United States and in some other countries. The requirements to be met for the award of the doctor of science degree are even more rigorous, something like those for the D.Sc. degree in the United Kingdom or the *doctorat d'Etat* in France; however, no official equivalence for it is recognized by the Soviet authorities. Both degrees are conferred by special academic councils set up at the higher education or research institutions where they can be earned and confirmed by the SCC.

7.2. Academic Titles

The academic titles of professor and assistant professor refer to level of pedagogical qualification. Thus, the title of assistant professor is conferred on holders of candidate of science degrees employed at institutions of higher education where they have achieved the requisite seniority, have produced the required number of publications, and have fulfilled some other requirements. The title of professor is conferred on doctors of science with a long term of service at a given institute or university and a distinguished record of research, publication, and teaching. Until recently, the titles of assistant professor and professor were awarded by the SCC according to the recommendations of academic councils. As of 1987, these titles are conferred by the State Committee for Public Education. Moreover, a number of higher education institutions have been authorized to confer the titles of assistant professor and professor themselves.

7.3. Distribution of Different Types of Staff Members of Varying Rank

By the end of the 11th five-year plan, 413,000 teachers and professors were employed in the institutes and universities of the USSR, not counting the 102,000 staff research workers, of whom 74,000 were engaged in research on a contractual basis. The following categories refer to teachers and professors: rectors of institutes and universities, pro-rectors for training, deans of faculties, heads of chairs (departments), professors, assistant professors, senior teachers, teachers, and assistant lecturers. By the end of 1986, doctors of science made up 4.8 per cent of the teaching staff, and candidates of science, 47.5 per cent. At the same time, professors made up 2.2 per cent of the teaching staff and assistant professors, 28 per cent. Of the staff research workers employed in higher education institutions, 22,000 held the degrees of doctor of science and candidate of science. Teachers and assistant lecturers constitute the most numerous category of teaching staff members (35.5%), while the proportion of senior teachers amounts to 23.7%.

7.4. Recruitment of Staff Members

The teaching staff members of higher education institutions are selected on a competitive basis. Until 1987, persons serving as department heads, professors, assistant professors, senior teachers, and assistant lecturers could have their service contracts renewed non-competitively; however, as of that year the principle of competitive renewals has been introduced for managers, research workers, and teaching staff members. The demands placed on these people with regard to their pedagogical and scientific qualifications, their ideological views and moral qualities and their abilities with regard to the training of specialists have been greatly increased. The system of reelection of research and teaching personnel causes the individuals concerned to feel increased responsibility for what they are doing, stimulates their concern for the quality of their work and its promotion, and attracts highly qualified specialists from national enterprises to teaching in higher education institutions.

Announcements for competitions to fill vacancies in higher education institutions are regularly published in the press. Applicants must submit written requests, accompanied by copies of all the necessary papers confirming their scientific and pedagogical qualifications, published works, etc., to be admitted to specific competitions. Completed application dossiers are carefully examined and discussed by the chairs and the various recruitment commissions and the academic councils of faculties, institutes, and universities. Each competition is concluded by a secret vote of the academic council in question. A majority of 2/3 is required for appointment.

The numbers of teaching staff members assigned to given higher education institutions used to be determined strictly by the size of their student enrollments, according to a standard ratio of average numbers of students per teacher. Thus institutions had no impetus to dismiss mediocre students, for a reduced number of students led to a reduction in the number of teaching staff members. The tendency became one of making only light demands on the knowledge of students and of graduating them more-or-less automatically.

Steps are currently being taken to eliminate the automatic link between the number of teachers employed and the number of students dismissed for academic deficiencies. The number of teachers and professors will now be determined by the size of student contingents at the moment of admission for full-time studies, without any consideration of the number of discharged students.

The task set for the twelfth five-year plan is to reduce the student/teacher ratio so that by the start of the thirteenth five-year plan, it will stand at 1 to 8 for full time course programmes, 1 to 15 for evening course programmes, and 1 to 35 for correspondence course programmes.

7.5. Postgraduate Course Programmes

Most teaching staff members assigned to higher education institutions are trained through enrollment in the postgraduate course programmes offered by the institutes and the universities which are equipped to do so. About 60,000 postgraduate students are enrolled in institutions of higher education, and about 40,000 are enrolled in postgraduate programmes attached to research institutions. Each postgraduate student has developed an individualized plan of study to cover a period of three years during which he will prepare for and take postgraduate examinations in philosophy, in a foreign language, and in special subjects, as well write and defend a thesis. Every postgraduate student is advised and guided by an adviser drawn from among the doctors of science and the professors of the given higher education institution. Each adviser is personally responsible for the training of the postgraduate students assigned to him.

The postgraduate students in higher education institutions are assigned to chairs according to the subjects of their theses. They are actively involved in the training of students in their chairs and in the research and methodological work being undertaken by the chair staffs. Postgraduate students are involved in pedagogical training during their entire periods of study. This training involves their participation in lectures, studies of higher education teaching methods, and in the elaboration of lecture programmes. All postgraduate students must engage in practice teaching.

Postgraduate students complete their studies with defenses of theses which must be of high quality, reflecting the results of independent research on questions of theoretical and practical signifi-

cance. The theses must embody scientifically substantiated conclusions and recommendations which contribute to the solution of current scientific problems. Those who are successful in defending their theses are conferred the degree and diploma of candidate of science. These persons also qualify as "research workers" in their respective fields and are awarded diplomas that confer advantages to them when they fill positions that require an advanced level of training.

The guidelines for the reform of higher education envisage the extended training of research and teaching personnel by means of postgraduate course programmes, mostly on a full time basis. The importance of these programmes will grow in response to the expanding role of research as an underpinning of production.

Another trend with regard to the training of young researchers and teachers for higher education institutions is the appointment of young specialists as so-called practical students in teaching and in research. These may be higher education graduates, research workers, laboratory assistants, engineers, and other staff members of higher education institutions who have an inclination for teaching. Practical students work under the supervision of professors or assistant professors according to individual study plans which include work in their specialities as well as in psychology, pedagogical subjects, and teaching practice. Provisions exist for the expansion of this kind of training.

In the Soviet Union, great importance is attached to the training of personnel to the highest levels of qualification through doctor of science programmes. Candidates for doctor of science degrees have generally their theses as parts of their research and teaching activities. In order to provide doctoral candidates with more favourable conditions for the completion of their theses, they can be transferred from teaching to full time research for up to a year or enrolled in doctoral courses.

Holders of the candidate of science degree, who are no more than forty years old and not only have made contributions to research in their respective fields but give promise of continuing to do so, may enroll in doctor of science programmes. Candidates, known as *doctorands*, receive state stipends equal to their salaries (but no more than 300 roubles a month). *Doctorands* from out-of-town will be provided with studio apartments or hotel accommodations paid for by the institutions having seconded them to doctoral studies. The years devoted to doctoral work are counted as time spent doing research.

7.6. Need for Retraining and Continuing Education Facilities

Given the need for the renewal of knowledge which the scientific and technical revolution has brought about, the qualifications of the various ranks of teachers employed in higher education establishments must be constantly upgraded. In partial fulfillment of this need, the Soviet higher education system now includes 100 sectoral

institutes for the advanced training of administrators and specialists, 194 advanced teacher training institutes, and 16 institutes for the advanced training of medical doctors. In addition, there are 346 faculties of advanced training at institutes and universities and over 900 advanced training courses in factories and in other types of organizations. Although the system provides training for about three million students annually, the present facilities only permit specialists to improve their qualifications once every 10 to 12 years even though in most domains upgrading is required at least every five years. Reducing this gap is the responsibility of higher education.

7.7 Higher Education and Continuing Education

Higher education institutions must reduce the gap between the need for refresher courses and their availability by determining the content of training at every stage of the system and by establishing closer links between stages of training. They must reach decisions with regard to the special faculties which provide non-degree training in the latest trends in science and technology.

Moreover, the higher education system as a whole will be given responsibility for directing all the methodological work carried out in more than 1,000 advanced training units. Thus, individual establishments will have increased responsibility for the life-long training of their graduates.

According to the "Guidelines", measures are being worked out to make continuing education a question of state planning, to expand its network, to establish qualification certificates, and to determine the exact status of the special retraining faculties.

The expanding role of higher education and the more efficient use of the teaching staffs of higher education for retraining is viewed as a major national task. Along with the relevant ministries and departments, higher education is entrusted with the task of setting up intersectoral and sectoral training centres, institutes, and faculties for the advanced continuing education of specialists, particularly in new fields of science and technology. Institutions of higher learning are also entitled to set up courses on a commercial basis for citizens who are willing to acquire certain kinds of knowledge: computer technology, foreign languages, etc. Institutes wishing to take responsibility for the retraining of their own staff members may set up special departments for that purpose.

The state is pledged to provide favourable conditions for all citizens who wish to refresh their knowledge. The reform of the secondary and vocational schools and the restructuring of higher and specialized secondary education along with the state system for the advanced training and retraining of specialists will guarantee that a uniform system of continuous education will be established in the country, in conformity with the decision of the 27th Congress of the Communist Party of the Soviet Union (CPSU).

In short, the real contribution of higher education to the system of continuing education is to uphold within the sphere it occupies the uniform state policy with regard to the education, training, retraining, and advanced training of higher education personnel, the latter being aligned with the socio-economic, scientific, and technical needs of social production and the fulfillment of the requests of citizens for educational and cultural enrichment.

8. THE PLANNING AND THE FINANCING OF HIGHER EDUCATION

8.1. Drawbacks of Over-Centralization

Today the whole system by which Soviet higher education is planned and financed, one which in the past was highly centralized, is undergoing a profound restructuring.

In the past, such centralization was perceived as beneficial because it guaranteed the regularity and the stability of state financing, facilitated rapid decision-making (and when necessary the opening of new institutions), and the concentration of all the necessary means for the realization of a plan. However, the over-centralization of management and the elimination, in actual reality, of an economic basis for feedback as a regulator of the qualitative and quantitative parameters of the activity of higher education, led to its estrangement from the real demands of social life. As a result, the system as a whole became very passive. The drawbacks of such a system of management became particularly evident with the appearance of a gap — one which has grown constantly — between the qualifications which industrial concerns and other employing organizations are requiring new employees to have and the qualifications imparted through higher education.

Before the era of *perestroika*, the users of highly qualified manpower had little chance to influence the way in which it was trained. Likewise, higher education institutions had few possibilities for influencing the "users" of their "products" as to their proper use, particularly the provision of conditions for them to realize their potentials. This state of affairs was reflected in the whole production cycle, from the training of specialists to the practical use of their training. The existing forms of co-operation between industrial enterprises and educational institutions did not exert influence in either direction and did not touch such questions as the transposition of capital investments, technical equipment, and targeted stipends. Neither side felt any responsibility for the final results of production expenses.

8.2. Elements of Decentralization

An essential principle which must be retained in any attempt at reforming the mechanism for the planning and the financing of higher

education is that of the financial autonomy of educational institutions. Although the tendency in the USSR in higher education institutions now favours the development of elements of self-financing and self-regulation, these must be compatible with those aspects of centralized planning and state financial support which will be retained.

What is particularly new with regard to the planning of higher education in the USSR is a concept which presupposes a definite commitment by a given higher education institution to a client as to the number of specialists to be trained and the quality of the training to be offered. Plans are no longer elaborated at the "top" and sent "down" as in the past. The given higher education institution itself must make a commitment to any organ which itself may become a client: a state, a ministry, an enterprise, a co-operative, etc.

8.2.1. Planning and Management on a Contractual Basis

Commitments (or plans) should be formulated on a contractual basis in accordance with the principles of partnership. The contracts will be of varying types, depending on the goals, the conditions of supply, and the degree of subordination of the two parties. At first, initial contracts will be negotiated which deal with the fixing of terms (periods), the fields of operation, and the conditions of execution with regard to the prerogatives of both partners. Little by little, direct forms of contracts between educational institutions and various clients will evolve into mass forms.

At the same time, the degree of centralization which will continue to exist with regard to the training of specialists will necessarily give rise, as in the past, to the establishment of contracts based on state orders the filling of which is compulsory. In general, such orders will be established by the central organs of management and planning, but at their request, certain sectoral ministries and departments might also become clients. If these ministries and departments were among those which sponsor higher education institutions, the latter could be entrusted with the realization of the contracts in question. In fact, order could be addressed directly to them.

The differences in types of contracts arise as a result of differences in goals and are characterized by varying conditions of resource allocation.

Direct contracts are intended to facilitate the flexible and efficient training of specialists in accordance with changing conditions in the activities of enterprises, associations, branches of industry, and regional complexes. Most contracts have five year terms. Their financial terms should as much as possible require total self-financing and self-development and should reflect a contractual volume (price) for guaranteed expenditures by the given client for the training of specialists.

Contracts based on state orders should first of all be directed at the retraining of specialists with regard to the new strategic orienta-

tions of science, technology, and industrial production. But they should also deal with the principal disciplines dealing with those aspects of social and cultural affairs which are financed by the state budget (health protection, general education, etc.). The volume of resources (primarily financial resources) to be allocated to the elaboration of contracts should be established on the basis of progressive standards representing the "basic price" for the training of specialists and the allotment of resources for the needs of the state according to the principles of centralization and priority.

Even in the case of centralized mechanisms for the establishment of contracts, opportunities to delegate some of the functions of contract making downward in the governmental hierarchy should be maintained, especially with regard to the rights of clients of specialists dealing with the social and cultural complex. These functions could be delegated to the Union republics and ever further down the territorial organs of management (local Soviets). The financing at these levels would still be undertaken at the expense of a state budget of corresponding level, and by subsidies, when necessary, from the central (all-union, republic) budget.

To ensure the public backing of the system of higher education, it should be supported with all necessary subsidies, independent of the working conditions in given institutions, either by way of direct contracts or on the basis of the state budget.

The element of personal responsibility at all levels is required in the distribution of budgetary allocations and activities. Social control of the process at every level is also required through such organs as deputy commissions, social councils, etc.

The shift to such systems of planning presupposes drastic changes in the content, form, and role of state planning with regard to the training of specialists, falling as it does, into the purview of several levels (stages): sectoral and territorial. It thus becomes quite reasonable to envisage the financing of the training of specialists for public education and health protection through the budgets of the republics and even of the regional organizations (the *krai* and the *oblast*), for the direct financing of the training of these categories of personnel is possible through the resources of corresponding regional budgets. In such cases, there is no need to "drag" all the indices of a plan through all the vertical lines of a system of planning. Also no need exists to engage in such complicated procedures with regard to the training of specialists on direct contracts financed by a client.

Soon, what is currently understood as the state plan for the training of specialists will refer only to a plan for the training of a limited number of persons in new trends of science, and technology as the result of an order formulated by certain state organs such as the State Committee of the USSR for Science and Technology. Expressed in other terms, the state plan is, in fact, a state order for specialists, the filling of which is ensured through the marshalling of centralized resources.

8.2.2. Greater Financial Responsibilities for Individual Institutions

For individual higher education institutions to play an active role in planning, a considerable change in the functions of the whole system of planning organs is required. Thus, the functions of the sectoral ministries and departments which administer various education institutions will have to change from being administrative to being purely intermediary. The higher education institutions in question will have to be able to anticipate the perspectives and the development tendencies of the specialties which they offer, the employment possibilities, both locally and in other regions of the country, for the specialists they train, the need for supporting material and technical development, and the need for continuing education courses for specialists. One of the most important tasks in this respect is the generalization of the plans of sub-departmental educational institutions and their consideration by higher planning organs.

8.3. Role of the Central and Territorial Administrations

Gosplan (the State Planning Commission of the USSR) should concentrate primarily on such questions as choices of strategy in the development of professional education; on the proportions to be given to diverse aspects of development including scale and structure; and on the improvement of the economic mechanism of the functioning of planning, including the system of long-term standards.

Territorial planning organs are becoming increasingly important today. Thus, administrative instructions and control no longer underlie the elaboration of balances of distribution of young people according to professional training. Rather they serve to orient educational institutions themselves and to inform them of possible changes in the structure of demand for given kinds of specialists and changes in demographic conditions. In addition, the local Soviets themselves should play the role of clients seeking specialists for territorial complexes, mainly in the cultural and social spheres, thus ensuring under certain conditions the material and technical development of targeted institutions.

There is yet another important aspect of higher education planning — the rational distribution of higher education institutions in the various Union republics and economic regions, so as to correspond with the general plan for the distribution of productive forces in individual regions.

8.4. Breakdown of Expenditures and Subsidies

Most of the expenditures incurred by higher education institutions are for the salaries and wages, paid to teaching staffs including

extra teachers, assigned to all forms of training, the salaries of administrative personnel, the wages of service staffs, and overtime remuneration. Wage and salary funds for the staffs of higher education institutions are estimated according to an average rate.

8.4.1. Staff Salaries

Currently, plans are being made to gradually introduce new conditions for the payment of salaries in higher education institutions. The salaries paid to heads of chairs, professors, assistant professors, teachers, and assistant lecturers should rise. The same should be true of the salaries paid to managerial staffs, administrative and supply department workers, subsidiary personnel, workers involved in production and in workshops, supervision of study and methodological rooms, and other kinds of specialists and employees. The salaries of teachers will be increased on the basis of their qualifications, the result of their research and teaching activities, and their length of service.

8.4.2. Student Stipends

The second most important item of expenditure in the budget of higher education is the allocation for student subsidies and grants. These are based on estimates of the annual number of students enrolled in full time divisions as multiplied by the established amount per student to be paid from the state budget. This calculation does not take into consideration the grants paid to students by the enterprises which second them to higher education institutions.

Currently the monthly grants paid to students are as follows: 40 roubles for the 1st to 4th-year students and 45 roubles a month for the 5th to 6th-year students (or to 4th-year students in programmes in which the 4th year is the terminal year). As of the 1st of September, 1987, excellent students have been receiving a bonus of 50% per month; good students have been receiving bonuses of 25%. During the 13th five-year plan, grants will be provided to all students who have earned passing grades in all their subjects.

As of 1 September, 1987, students with good grades who have been seconded to higher education by their enterprises are receiving stipends from these enterprises which are at least 30 per cent higher than in the past — 50% for those who have been employed with the seconding organization for at least three years. In no case, however, does the stipend exceed 100 roubles a month.

8.4.3. Equipment Subsidies

Higher education receives an additional subsidy through the grant of equipment and materials by enterprises of various sorts in-

cluding factories. It is also the recipient of funds, derived from the industrial construction budget, for capital investment for the construction of various kinds of buildings. Those institutions which are under the authority of specific ministries and departments receive funds from them.

8.5. Limited Future for Centralized Financing

In view of the economic changes which the USSR is undergoing today, the factories and other kinds of organizations which make requests for specialists will finance an increasing share of the budget for higher education. Centralized financing will be used mostly for the training of specialists in the social and cultural spheres and in strategic fields of scientific and technical development.

9. HIGHER EDUCATION AND SOVIET INTERNATIONAL CO-OPERATION

The new thinking with regard to foreign policy and international relations put forward at the XXVII Congress of the Communist Party of the Soviet Union (CPSU) is having a direct and beneficial impact on the foreign relations of the educational, scientific, and cultural institutions of the country.

Soviet international co-operation with regard to education is developing in several directions and is taking place in a variety of forms. The latter include the training of foreign specialists in Soviet educational establishments; the granting of assistance to various foreign countries in the organization of the training of personnel in their own educational institutions which may have been built and equipped by Soviet experts; the secondment of teachers to foreign educational establishments; the exchange of students and researchers at all levels of study; and participation in the activities of international organizations dealing with education, in scientific conferences, and in seminars devoted to educational topics.

In furthering the development and the strengthening of international contacts, Soviet higher education institutions assume that co-operation on equal terms contributes actively to the promotion of mutual understanding between nations, plays an important role in cultural progress, and serves as an efficient channel for the achievement of exchanges of experience. It thus benefits all the parties involved in such co-operation. Last but not least, international co-operation in such an important social field as education is entirely in keeping with the spirit and the letter of the recommendations put forth by the 18th session of the General Conference of Unesco and of the provisions contained in the Final Act of the Conference on Security and Co-operation in Europe.

9.1. Co-operation with the CMEA Countries

The higher education institutions of the socialist countries have not developed in isolation but in close co-operation according to the terms of the Complex Programme of Socialist Economic Integration, the implementation of which received a new impulse at the Summit Economic Conference of the CMEA Member States, which was held in Moscow in the summer of 1984. Many types of co-operation and

mutual assistance schemes link Soviet higher education institutions with their counterparts in other socialist countries. Large-scale exchanges of students, postgraduates, and teachers are considerably facilitated by the Convention on the Mutual Recognition of Secondary and Specialized Secondary School-Leaving Certificates, of Higher Education Diplomas, as well as of Diplomas Granted for Academic Degrees and Titles, which was signed in 1972 by the USSR and other socialist countries.

In 1986, 43,700 students from the socialist countries were studying in the USSR. Of these, about 28,000 were enrolled in higher education institutions; more than 3,000 in postgraduate courses; and 3,800, in specialized secondary education institutions. As a result of co-operation and mutual assistance, the higher education systems of the socialist countries have reached such a level of development that they are not only capable of meeting the demands of their countries for specialists but are able to train personnel from developing countries, thus helping to build up the national intelligentsias of these countries.

Substantial efforts aimed at developing co-operation with regard to the education and training of scientific and technical cadres in the socialist countries have been carried out for the last forty years within the framework of the CMEA. Recommendations which were adopted at the second session of the CMEA in 1949 laid down the directions for such co-operation, specifying that it would include the training of scientific and technical cadres in higher and specialized secondary education establishments, exchange of curricula and syllabi, the elaboration of various kinds of teaching aids, and the organization of scientific conferences and seminars.

Until the early 1960's, co-operation in education among the socialist countries developed on the basis of bilateral agreements. As a result of the rapid increase in the demand for highly qualified personnel, a major decision was taken at the 16th session (an extraordinary session) of the CMEA relative to the development of multilateral co-operation. The CMEA Standing Commission on the Co-ordination of Research in the Scientific and Technical Fields was set up and was given a major role in the implementation of co-operation. The Commission formulated a list of all the academic and scientific disciplines in demand, and a rank-order listing of types of researchers, both of which are used along with other documents elaborated at the Conference in setting the ground rules for the development of co-operation in the training of scientific personnel.

An important stage in this co-operation process is linked to the implementation of the tasks specified in the Complex Programme of Socialist Economic Integration which was adopted at the 15th CMEA session, held in July 1971. It included the following fundamental issues related to education:

- the further expansion of co-operation in the training of scientific cadres in the major national scientific research institutes and higher education institutions;
- the use, based on special agreements linking the CMEA coun-

- tries, of the facilities of specialized and international research institutes for the upgrading of the qualifications of scientific cadres through the organization of specialist courses, of seminars, of scientific conferences, and of research visits;
- increased exchanges among the teachers assigned to advanced training courses.

The Conference of Ministers of Higher Education of the socialist countries is playing a significant role in the development of co-operation among the CMEA Member Countries in the domain of staff training. It constitutes the primary information, consultative, and co-ordinating body for the implementation of coordination among the socialist countries in higher education. It holds meetings at least every two years. So far 15 such meetings have been held.

The first two conferences (Moscow, 1966, and Budapest, 1967) established the themes and the principal guidelines of co-operation in higher education among the socialist countries. The subsequent conferences focussed on major issues of co-operation. Thus, the discussions at the third conference, held in October 1968 in Varna (Bulgaria) centred around the following topic: "The Scientific and Technical Revolution and the Education, Training, Specialization, and Further Training of Personnel with Higher Education Qualifications". The conference adopted a summary plan of the most important research to be conducted in the field of higher education, assigning responsibility for a specific theme to each country. The 4th, 5th, and 6th conferences resulted in a further concretization of the selected co-operation areas and in more accurate definitions of the scientific research plans.

The 7th conference, held in 1972, adopted a proposal put forth by Poland to the effect that the international review of higher education in the socialist countries, *Sovremennaya Vysshaya Shkola* (Contemporary Higher Education), be published in Poland under the sponsorship of a Polish university. The function of this journal is to publicize the experiences of various higher education institutions in the socialist countries and the results of research conducted in the domain of higher education.

At the same conference, the USSR was assigned the task of heading research to be undertaken on the topic, "The Scientific Organization of Higher Education".

In 1974, at the 8th Conference held in Havana, the decision was taken to establish direct research links among the higher education research institutes of the socialist countries.

At the 10th Conference which was held in Moscow in 1976 a recommendation was made that the socialist countries carry out joint scientific research projects on the basis of five-year co-ordination plans. The first plan which was adopted for the 1976—1980 period marked the culmination of a major effort which had been aimed at creating an effective mechanism for the planning and the organization of scientific research on higher education within the community of the socialist countries. This mechanism has been further perfect-

ed, with groups of experts having been established, whose tasks are to examine the progress that has been made in scientific research during periods between conferences of ministers and to make appropriate recommendations.

The 1986 Conference of Ministers (Prague, October, 1986) focussed its debates on current issues having to do with the improvement of higher education in the socialist countries resulting from decisions which were adopted by the congresses of the communist and workers' parties in these countries as derived from the plans of economic and social development for the 1986—1990 period. It also confronted issues linked to prospects for the further development of higher education. The participants discussed reports which were submitted on the fulfillment of the five-year research co-ordination plan of socialist countries for the 1981—1985 period and examined the plan of scientific research for the 1986—1990 period.

The reports in question bore witness to the important contributions that scholars from the USSR and from other socialist countries are making with regard to the resolution of present-day problems related to the development of higher education in contemporary societies. Included here are problems pertaining to the content and to the planning of the teaching and learning processes in higher education, to the improvement of teaching forms and methods, to the recruitment of students, to the research conducted in higher education institutions, to the planning of specialist training, and to the forecasting of developments in higher education.

The expansion and the deepening of the processes of economic integration (the setting up of joint ventures, the co-operative links established between industrial complexes in various socialist countries, joint research programmes, etc.) have given rise to the need to bring the various higher education systems of the socialist countries closer together, particularly for the training of researchers, engineers, and other technical workers including economists and managerial personnel. The creation of a particular kind of infrastructure will be needed; one capable of including the existing components of co-operation (the periodic meetings of the ministers of higher education, of groups of experts, of the editorial board of *Sovremennaya Vysshaya Shkola*), along with newly created bodies such as the Co-ordinating Council of the Conferences of Ministers, the International University of the CMEA Member Countries, and the Standing Conference of Rectors, Presidents, and Vice-Chancellors of the European Universities (CRE), and other such organizations.

As outlined above, major changes are now taking place in the education system of the USSR. Substantial changes are also taking place in the education systems of the other socialist countries. As a result, we are witnessing two processes: a further deepening of the co-operation existing among the socialist countries in the area of specialist training and the gradual integration of their systems of higher education. Both processes are in keeping with the strategic goals and tasks that were laid down in the Complex Programme of Scientific

and Technical Progress of the CMEA Member Countries and in the Complex Programme of Socialist Economic Integration.

9.2. Co-operation with the Developing Countries

Soviet co-operation with the developing countries in the domain of higher education is as fruitful as that with the socialist countries. More than half of the foreign students (58,600 in 1986) attending Soviet higher education institutions came from the developing countries. Of this total, 39,500 were enrolled in undergraduate programmes; 4,200, in postgraduate course programmes, more than 1,000 in probationary training programmes, more than 3,000 in specialized secondary education schools, and more than 10,200 in preparatory departments. Of the total number of foreign students from developing countries studying in the USSR, 24,000 came from Africa, 27,500 from Asia, and over 7,000 from Latin America.

The students from the developing countries are enrolled in many higher education institutions throughout the country. Patrice Lumumba People's Friendship University plays a special role by virtue of the fact that it is a specialized higher education establishment created to assist developing countries in the training of their national cadres. Over the 25-year period since the founding of the University, it has granted diplomas to 10,000 graduates who are now working in 110 countries. At present, about 7,000 undergraduate and postgraduate students from over 100 countries are enrolled in this University.

Students from the developing countries not only acquire in-depth theoretical knowledge and practical skills in their chosen specialties but they are also educated in the spirit of peace, respect for human rights, democracy, social progress, and friendship among all the peoples of the world irrespective of nationality, race, religion, etc.

In contrast to the market economy countries in which tuition fees for foreign students, including those from the developing countries, can be very high, Soviet education institutions of all levels exempt students coming from Africa, Asia, and Latin America from any fees. These students have the same rights to social assistance, free housing, medical care, etc., as do Soviet students.

In addition to training students from developing countries in its higher education institutions, the USSR gives these countries various kinds of assistance for the creation of the conditions necessary for the formation of qualified national cadres and for the setting-up and the strengthening of national systems of higher education. Examples of such assistance include the polytechnic institutes which were founded in Conakry (Guinea), in Kabul (Afghanistan), and in Bahir-Dar (Ethiopia), and the National Institute for Light Industry in Algiers, the Polytechnic Institute of Rangoon (Burma), the Higher National Engineering School of Tunis, and the Technological Institute of Bombay. All these institutes were created by means of Soviet

technical assistance. At present, about 50 higher education and specialized secondary institutions created and equipped with the assistance of the USSR are functioning in various developing countries.

Soviet teachers who are working in many higher education institutions in Africa, Asia, and Latin America at the invitation of the governments of the countries concerned are making important contributions to the training of specialists and to the development of education in the developing countries. A principal task of the teaching and research staffs which have been sent by the USSR to the developing countries is to aid in the formation of national centres of higher education. As part of this task, Soviet teachers participate in the educational, methodological, and research activities carried out by these centres.

The direct co-operation between Soviet higher education institutions and similar institutes in the developing countries has been broadened, particularly with institutions located in Algeria, Afghanistan, Angola, Ethiopia, Guinea, India, and the People's Democratic Republic of Yemen.

9.3. Co-operation with the Market Economy Countries in the Framework of International Organizations

The USSR participates in various activities undertaken by international organizations in the field of education, particularly in the activities of Unesco. The plans calling for the involvement of Soviet scholars and specialists in activities carried out under the auspices of this organization foresee the elaboration of several important problems linked to the development of higher education. Soviet higher education institutions co-operate closely with CEPES, the European Centre for Higher Education, taking an active part in its activities and exchanging information with it.

Soviet higher education establishments have expressed interest in establishing contacts and in developing co-operation with western-oriented higher education regional organizations. As the latter have indicated an interest in such co-operation, hopes have been expressed that in the context of *perestroika* and of new political thinking, the contacts between Soviet scientific research institutes dealing with higher education and their counterparts in the western countries will become more active than in the past, to the mutual benefit of all parties concerned. The current trend favours the co-operation of Soviet universities and other leading higher education institutes of the country in the framework of certain non-governmental organizations, particularly the International Association of Universities (IAU), the membership of which includes the most well-known universities of the USSR.

It is also worth mentioning that contacts between Soviet higher education institutions and educational and research centres in several market economy countries have recently started to expand. Di-

rect relations have already been established between Soviet universities and universities in western countries resulting in the efficient development of co-operation. The contacts existing between Soviet higher education establishments and similar institutions in the market economy countries are expanding within the framework of the inter-governmental relations, stipulated in the agreements with regard to co-operation in the sphere of culture. These agreements foresee exchanges of students, graduates, and professors. Although the figures are still insignificant, conditions are now ripe for their increase. As a full implementation of these possibilities would favour the further development of the Helsinki process, they would exert a positive influence on the solution of other international problems.

10. ANNEX

Table 1: Soviet Higher Education Institutions

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HIGHER EDUCATION IN THE USSR

Table 1

Soviet Higher Education Institutions (enrollment figures at the start of selected academic years)

	1940- 1941	1960- 1961	1970- 1971	1975- 1976	1980- 1981	1984- 1985	1985- 1986	1986- 1987	1987- 1988
All institutions of higher learning	817	739	805	856	883	892	894	896	898
Total number of students (in thousands)	812	2,396	4,581	4,854	5,235	5,280	5,147	5,088	5,026
full-time	558	1,156	2,241	2,628	2,978	2,932	2,763	2,688	2,675
evening	27	245	658	644	649	636	634	620	584
extra-mural	227	995	1,682	1,582	1,608	1,712	1,750	1,780	1,767

Table 2

Numbers of Soviet Universities and Graduates in Selected Years

	1960	1970	1975	1980	1984	1985	1986	1987
Number of universities	40	51	63	68	68	69	69	69
Number of students (in thousands)	249	503.5	565.9	609.4	601.3	590.2	586.7	583.6
Students admitted (in thousands)	65.6	96.3	112.8	117.8	117.8	119.9	120.6	121.0
Number of graduates (in thousands)	38.4	69.1	87.4	100.8	103.1	103.7	101.5	91.2

Table 3

**Higher Education Institutions of the Union Republics
(enrollment figures at the start of selected academic years)**

	1940-41	1960-61	1970-71	1980-81	1984-85	1985-86	1987-88
<i>USSR</i>							
Number of institutions	817	739	805	883	892	894	898
Number of students (in thousands)	811.7	2,396.1	4,580.6	5,235.2	5,280.1	5,147.2	5,025.4
<i>The Armenian SSR</i>							
Number of institutions	9	10	12	13	13	13	13
Number of students (in thousands)	11.1	20.2	54.4	58.1	57.5	54.8	55.7
<i>The Azerbaijan SSR</i>							
Number of institutions	16	12	13	17	18	18	17
Number of students (in thousands)	14.6	36.0	100.1	107.0	108.0	105.9	103.4
<i>The Byelorussian SSR</i>							
Number of institutions	25	24	28	32	33	33	33
Number of students (in thousands)	21.5	59.3	140.0	177.0	185.1	181.9	179.4
<i>The Estonian SSR</i>							
Number of institutions	5	6	6	6	6	6	6
Number of students (in thousands)	4.8	13.5	22.1	25.5	24.6	23.5	23.4
<i>The Georgian SSR</i>							
Number of institutions	21	18	18	19	19	19	19
Number of students (in thousands)	28.5	56.3	89.3	85.8	89.0	88.5	86.4
<i>The Kazakh SSR</i>							
Number of institutions	20	28	44	55	55	55	55
Number of students (in thousands)	10.4	77.1	198.9	260.0	282.8	273.4	274.0
<i>The Kirghiz SSR</i>							
Number of institutions	6	8	9	10	10	10	10
Number of students (in thousands)	3.1	17.4	48.4	55.4	58.9	58.2	57.5
<i>The Latvian SSR</i>							
Number of institutions	7	10	10	10	10	10	10
Number of students (in thousands)	9.9	21.6	40.8	47.2	45.2	43.9	43.7
<i>The Lithuanian SSR</i>							
Number of institutions	7	12	12	12	12	12	12
Number of students (in thousands)	6.0	26.7	57.0	71.0	68.5	65.3	66.0

HIGHER EDUCATION IN THE USSR

	1940-41	1960-61	1970-71	1980-81	1984-85	1985-86	1987-88
<i>The Moldavian SSR</i>							
Number of institutions	6	6	8	8	9	9	9
Number of students (in thousands)	2.5	19.2	44.8	51.3	53.6	53.2	52.1
<i>The Russian Federation</i>							
Number of institutions	481	430	457	494	500	502	506
Number of students (in thousands)	478.1	1,496.7	2,671.7	3,045.8	3,041.2	2,966.1	2,834.9
<i>The Tajik SSR</i>							
Number of institutions	6	6	7	10	10	10	10
Number of students (in thousands)	2.3	20.0	44.5	56.8	58.9	55.1	56.4
<i>The Turkmen SSR</i>							
Number of institutions	5	4	5	7	9	9	9
Number of students (in thousands)	3.0	13.1	29.1	35.8	38.9	38.8	40.2
<i>The Ukrainian SSR</i>							
Number of institutions	173	135	138	147	146	146	146
Number of students (in thousands)	196.8	417.7	806.6	880.4	878.4	853.1	852
<i>The Uzbek SSR</i>							
Number of institutions	30	30	38	43	42	42	43
Number of students (in thousands)	19.1	101.3	232.9	278.1	289.5	285.5	300.3

Table 4

Admission to Higher Education for Various Types of Training

	1940	1960	1970	1975	1980	1984	1985	1987
Total number of students (in thousands) admitted to institutions of higher education	263.4	593.3	911.5	993.8	1,051.9	1,087.2	1,104.0	1,092.5
full-time	154.9	257.9	500.5	593.9	639.9	643.5	649.9	655.2
evening	6.6	77.2	127.4	129.7	134.3	136.3	137.5	121.5
extra-mural	101.9	258.2	283.6	270.2	277.7	307.4	316.6	315.8

Table 5

Admission to the Sectoral Institutions of Higher Education

	1940	1960	1970	1975	1980	1984	1985	1987
Numbers of students admitted to higher education (in thousands)	263.4	593.3	911.5	993.8	1,051.9	1,087.2	1,104.0	1,092.5
including institutions dealing with:								
industries and construction	45.4	225.4	367.9	400.0	421.8	433.4	437.0	424.7
transport and communications	8.3	34.1	48.1	53.4	56.9	58.6	59.1	58.2
agriculture	11.9	62.7	85.0	96.7	103.2	108.5	110.1	107.7
economics and law	13.6	43.9	72.6	76.4	80.1	81.4	81.0	77.1
health service, physical education, and sports	23.0	36.8	60.5	65.4	69.3	70.2	69.7	70.5
education	159.0	185.1	269.0	292.6	310.7	325.0	337.2	344.6
art and cinematography	2.2	5.3	8.4	9.3	9.9	10.1	9.9	9.7

Table 6

**Enrollment Figures for the Sectoral Institutions of Higher Education
(at the start of selected academic years)**

	1940-41	1960-61	1970-71	1975-76	1980-81	1984-85	1985-86	1987-88
Numbers of students enrolled in institutions of higher education (in thousands)	811.7	2,396.1	4,580.6	4,854.0	5,235.2	5,280.1	5,147.2	5,025.7
in institutions dealing with:								
industries and construction	168.4	873.1	1,825.7	1,950.0	2,088.2	2,075.4	1,996.8	1,875.4

HIGHER EDUCATION IN THE USSR

	1940-41	1960-61	1970-71	1975-76	1980-81	1984-85	1985-86	1987-88
transport and communications	36.2	146.7	251.7	277.6	300.5	299.8	290.5	273.2
agriculture	52.1	246.5	423.9	460.0	533.8	552.6	532.8	520.7
economics and law	36.3	161.9	341.4	354.7	377.0	385.6	383.2	372.0
health services, physical education, and sports	109.8	188.9	321.0	351.6	378.7	388.3	376.0	362.6
education	398.6	759.6	1,375.7	1,415.3	1,509.0	1,529.1	1,519.6	1,572.5
art and cinematography	10.3	19.4	41.2	44.8	48.0	49.3	48.3	49.7

Table 7

Numbers of Student Enrollments according to Groups of Specialities (at the start of selected academic years)

	1960-61	1970-71	1975-76	1980-81	1984-85	1985-86	1987-88
Total (in thousands)	2,396.1	4,580.6	4,854.0	5,235.2	5,280.1	5,147.2	5,025.7
given specialities:							
geology and prospecting	21.3	39.3	38.2	38.8	39.3	37.6	36.5
mining	30.2	57.0	56.0	57.7	62.2	59.8	58.5
power engineering	74.7	100.8	116.5	122.3	118.5	113.6	104.5
metallurgy	31.5	55.5	56.2	59.2	60.3	57.5	50.9
engineering and instrument making	302.8	557.9	574.0	605.6	587.8	558.5	512.8
electronics, electrical engineering, and automatic equipment	91.5	309.4	329.2	359.1	368.3	360.3	353.4
including engineering automation	(8.4)	(47.6)	(79.9)	(98.5)	(104.9)	(104.3)	(106.4)
radio engineering and communications	78.3	154.1	149.1	158.6	161.6	155.4	145.4

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	1960-61	1970-71	1975-76	1980-81	1984-85	1985-86	1987-88
chemical technology	56.3	120.2	98.4	95.4	92.7	89.7	80.7
forestry engineering and production of wood, cellulose and paper	22.9	31.0	33.9	36.8	35.1	33.7	31.4
production of food- stuffs	31.3	72.2	75.9	85.1	88.4	86.0	81.5
production of consum- er goods	28.8	54.2	59.4	65.6	70.1	70.6	67.5
building	146.7	297.3	377.1	430.2	411.2	387.2	353.2
geodesy and cartogra- phy	5.9	8.7	10.6	12.8	12.4	11.7	10.9
hydrology and meteor- ology	5.2	8.4	8.0	8.3	8.2	8.0	7.6
agriculture and fores- try	236.3	371.9	401.4	456.2	465.2	444.8	433.0
transport	65.6	133.1	147.9	173.7	182.8	177.3	170.0
economics	217.7	538.6	597.7	638.1	659.5	658.5	647.1
including economic engineer- ing	(43.4)	(138.8)	(156.6)	(152.9)	(151.0)	(149.7)	(143.6)
law	40.3	77.0	93.2	101.6	102.5	100.7	97.9
health services and physical education	189.2	329.8	368.1	386.4	374.0	366.2	360.9
teacher training and institutes of culture	512.8	880.6	871.1	923.4	943.4	946.6	1,015.3
art	19.1	39.1	40.6	43.0	43.4	42.3	43.0

Table 8

**Numbers of Persons per 10,000 Enrolled in Higher Education
in the USSR and in Its Constituent Republics
(at the start of selected academic years)**

	1940-41	1960-61	1970-71	1980-81	1985-86	1987-88
URSS (as a whole)	41	111	188	196	185	177
Armenian SSR	82	106	214	186	163	161

HIGHER EDUCATION IN THE USSR

	1940-41	1960-61	1970-71	1980-81	1985-86	1987-88
Azerbaijan SSR	44	91	191	173	158	150
Byelorussian SSR	24	72	154	183	182	177
Estonian SSR	45	111	161	172	153	149
Georgian SSR	77	134	189	169	169	163
Kazakh SSR	16	75	151	173	171	166
Kirghiz SSR	19	79	162	152	144	136
Latvian SSR	52	101	171	186	167	163
Lithuanian SSR	20	95	180	206	181	179
Moldavian SSR	10	63	124	128	128	123
Russian Federation	43	124	204	219	206	194
Tajik SSR	15	94	149	142	118	114
Turkmen SSR	22	81	131	124	119	117
Ukrainian SSR	47	97	170	176	167	166
Uzbek SSR	28	116	192	172	154	154

Table 9

Numbers of Graduates in Thousands per Training Format (for selected years)

	1940	1960	1970	1975	1980	1984	1985	1987
Total number of graduates— all divisions in all institutions	126.1	343.3	630.8	713.4	817.3	855.0	858.9	767
full-time:	97.8	228.7	334.8	433.3	518.0	550.6	549.1	451
evening:	4.4	15.4	82.1	79.7	85.3	84.0	83.1	79
extra-mural:	23.9	99.2	213.9	200.4	214.0	220.4	226.7	237

Table 10

Numbers of Graduates of the Sectoral Institutes

	1940	1960	1970	1975	1980	1984	1985	1987
Numbers of graduates according to areas covered (in thousands)	126.1	343.3	630.8	713.4	817.3	855.0	858.9	763.3
including institutes:								
industries and construction	24.2	95.2	214.2	260.0	303.0	314.3	313.8	269.7
transport and communications	5.9	16.1	28.2	33.3	40.6	42.5	42.4	34.9
agriculture	10.3	34.7	68.7	62.6	75.3	83.3	83.4	76.5
economics and law	5.7	25.0	50.9	60.5	66.3	69.3	71.3	68.7
health services, physical education, and sports	17.4	30.7	42.9	53.9	60.4	64.0	65.1	61.4
education	61.6	139.1	219.2	235.3	263.3	272.5	273.7	244.0
art and cinematography	1.0	2.5	6.7	7.8	8.4	9.1	9.2	8.4

Table 11

Numbers of Graduating Students according to Groups of Specialities

	1960	1970	1975	1980	1984	1985	1987
Numbers of graduates in thousands in the following specialities:							
Total	343.3	630.8	713.4	817.3	855.0	858.9	768.1
geology and prospecting	3.9	5.1	5.9	6.2	6.2	6.3	5.2
mining	5.3	6.3	8.3	8.7	9.2	9.2	8.0
power engineering	8.4	10.5	14.1	17.1	17.9	17.5	14.8

HIGHER EDUCATION IN THE USSR

	1960	1970	1975	1980	1984	1985	1987
metallurgy	3.9	6.5	7.8	8.7	9.0	9.1	8.5
engineering and instrument making	30.6	69.0	73.0	84.6	85.7	85.6	70.7
electronics, electrical engineering, and automatic equipment, including "Automated Management Systems"	8.1	40.5	49.6	52.9	56.3	56.6	51.6
	—	—	(4.1)	(4.9)	(5.3)	(5.2)	(5.3)
radio engineering and communications	6.3	19.8	18.8	22.4	23.9	23.9	21.7
chemical technology	5.7	16.1	15.4	14.7	14.6	14.2	13.3
forestry engineering and production of wood, cellulose, and paper	3.7	3.3	4.7	5.7	5.8	5.5	4.9
production of food-stuffs	3.5	7.9	10.5	12.2	13.4	13.6	12.7
consumer goods production	3.1	5.4	7.6	8.9	10.3	10.5	10.0
building	17.7	30.3	44.8	61.3	64.3	63.8	49.5
geodesy and cartography	0.6	1.0	1.3	2.0	2.1	2.1	1.7
hydrology and meteorology	0.7	1.1	1.3	1.3	1.3	1.3	1.1
agriculture and forestry	34.5	58.3	53.9	64.5	70.1	70.0	60.8
transport	6.6	14.9	17.5	22.0	25.0	25.4	22.7
economics	30.7	75.6	95.6	108.2	113.1	115.3	112.9
law	6.0	8.1	13.1	16.3	17.2	17.3	16.2
health services and physical education	30.6	43.8	53.6	59.6	63.6	64.9	61.9
university specialities	29.9	48.7	54.6	64.1	64.6	64.1	56.3
teacher training and culture	101.0	152.2	154.7	167.8	173.3	174.7	156.3
art	2.5	6.4	7.3	7.5	8.1	8.0	7.3

ANNEX

Table 12

**Numbers of Graduates per 10,000 in the USSR
and in its Constituent Republics during Selected Years**

	1960	1970	1980	1985	1987
USSR (as a whole)	16	26	31	31	27
Armenian SSR	17	31	35	34	26
Azerbaijan SSR	14	27	29	31	23
Byelorussian SSR	12	23	32	32	30
Estonian SSR	16	21	25	23	19
Georgian SSR	18	26	29	31	25
Kazakh SSR	10	21	26	28	23
Kirghiz SSR	11	21	23	25	21
Latvian SSR	13	20	27	27	23
Lithuanian SSR	12	23	30	32	25
Moldavian SSR	10	19	21	22	18
Russian Federation	17	28	33	33	30
Tajik SSR	11	20	20	22	17
Turkmen SSR	14	20	20	22	17
Ukrainian SSR	16	25	30	30	26
Uzbek SSR	16	28	28	27	20

Table 13

**National Income and Expenditure for Higher Education
(not counting capital investment)**

	1940	1950	1960	1965	1970	1975	1980	1985	1987
1. National income produced (billions of roubles)	33.1	54.3	145.0	193.5	289.0	363.3	462.2	577.7	599.6

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	1940	1950	1960	1965	1970	1975	1980	1985	1987
2. Expenditures for higher education from the state budget (billions of roubles)	0.3	0.7	1.1	1.5	2.2	3.0	3.7	4.1	4.2
3. Percentage of national income devoted to higher education	0.8	1.3	0.7	0.8	0.8	0.8	0.8	0.7	0.7
4. Budgeted expenditure per student (in roubles)	465	753	833	794	865	1,017	1,121	1,313	1,391

Table 14

Laboratories Conducting Research on Problems of Higher Education

1 Institutes and Universities	2 Laboratories	3 Research Themes
MEI (14 Krasnokazarmennaya Street, Moscow, 105835 RSFSR)	Higher Education Research Laboratory	Career Guidance and Selection of Student Contingents
MISis (4 Lenin Prospekt, Moscow 117936 RSFSR)	Higher Education Research Laboratory	Evaluation of the Quality of Training
UDN (3 Ordzhonikidze Street, Moscow 117302 RSFSR)	Higher Education Research Laboratory	Training of Personnel for Foreign Countries
Institute of Aircraft Instrument-making (67 Herzen Street, Centre, Leningrad, 190000 RSFSR)	Higher Education Research Laboratory	Personnel Training and Distribution in the Re- gion
Tajik State University (17 Lenin Prospekt, Dushanbe, 734016 Tajik SSR)	Higher Education Research Laboratory	Computer Assisted Training

ANNEX

1 Institutes and Universities	2 Laboratories	3 Research Themes
Byelorussian Polytechnic Institute (77, Building 10, Partisan Prospekt, Minsk-70, 220070 Byelorussian SSR)	Higher Education Research Laboratory	Advanced Training of Specialists
State Teacher Training Institute (5 Handzhan Street, Yerevan, 375010 Armenian SSR)	Higher Education Research Laboratory	Higher Education Psychology and Pedagogics
Estonian State University (18 Yulikooli Street, Tartu, 202400 Estonian SSR)	Higher Education Research Laboratory	Career Guidance, Advanced Communist Upbringing, and Active Methods of Training
MIU (99 Ryazan Prospekt, Moscow, 103733 RSFSR)	Higher Education Research Laboratory	Scientific Organization of Work in Higher Education
Novosibirsk State University (2 Pirogov Street, Novosibirsk, 630090 RSFSR)	Higher Education Research Laboratory	Automated Training Systems
Polytechnic Institute (5 Ehitayate tehe, Tallinn, 200026 Estonian SSR)	Higher Education Research Laboratory	Economics of Higher Education
Kazan State University (18 Lenin Street, Kazan, 420008 RSFSR)	Higher Education Research Laboratory	Computer Assisted Training
Institute of Engineers for Public Utility Construction (12 Revolution Street, Kharkov, 310002 Ukrainian SSR)	Higher Education Research Laboratory	Student Practical Work
Riga Polytechnic Institute (1 Lenin Street, Riga 226355 Latvian SSR)	Higher Education Research Laboratory	Administration of Engineer Training
Odessa Polytechnic Institute (1 Shevchenko Prospekt, Odessa, 270044 Ukrainian SSR)	Higher Education Research Laboratory	Automated Training Systems
East-Siberian Technological Institute (26 Smolin Street, Ulan-Ude, 670000 RSFSR)	Higher Education Research Laboratory	Continuous Practical Training in Technical Institutes
Azerbaijan State University (23 Lumumba Street, Baku, 370122 Azerbaijan SSR)	Laboratory for the Forecasting of Higher Education Development	

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1 Institutes and Universities	2 Laboratories	3 Research Themes
State University of Dnepropetrovsk (72 Gagarin Prospekt, GSP-211, Dnepropetrovsk 10, 320625 Ukrainian SSR)	Laboratory of Advanced Training	Advanced Methods to Determine the Need for Specialists
Institute of Engineering Economics (27 Marat Street, Leningrad, 191002 RSFSR)	Inter-Institute Laboratory for Education in Engineering Economics	Basic Educational Trends and Factors in Engineering Economics
Moscow State University (Lenin Hills, Moscow 117234 RSFSR)	Chair of Economics of the Service Sector	Socio-Economic Efficiency of Higher Education
Institute of Chemical Technology (9 Miuss Square, Moscow, 125820 RSFSR)	Information Centre for Higher Education Problems	Organization of Information Services in Higher Education
Leningrad State University (7/9 University Embankment, Leningrad B-164, 199164 RSFSR)	Comprehensive Social Research Centre. Department of Higher Research Education	Advanced Systems of Communist Education
Electrotechnical Institute (5 Professor Popov Street, Leningrad, 197022 RSFSR)	Joint Research Laboratory for the Socio-Economic Problems of Higher Education	Analysis of New Ways to Organize Research on Higher Education
Polytechnic Institute (29 Polytechnic Street, Leningrad, 195251 RSFSR)	Higher Education Research Laboratory	Methods to Determine the Socio-Economic Efficiency of Higher Education
Perm Polytechnic Institute (29a Komsomol Prospekt, Perm 614600 RSFSR)	Laboratory for the Sociology of Higher Education	The Intensification of Training and Research in Higher Education
Tomsk Polytechnic Institute (30 Lenin Prospekt, Tomsk, 634004 RSFSR)	Laboratory for Problems of Higher Education Management	Evaluation of the Quality of Training in Higher Education
Kazakh State University (136 Kirov Street, Alma-Ata, 480091 Kazakh SSR)	Joint Laboratory for Problems in Higher Education	Ways to Develop New, Active Methods of Teaching

Table 15

Organizations which Publish on Questions of Higher Education

No. 1	Organization 2	Address 3	Publications 4	Brief Description 5
1.	Research Institute for Higher Education	20 Podsosensky Lane, Moscow, K-62, 103062 RSFSR	1. Communist Education in Higher Education 2. Content, Forms, and Methods of Training in Higher Education Institutions 3. Teaching Aids in Higher Education 4. Management, Economics, and Forecasting of Development in Higher Education 5. Scientific Organization of Information Services in Higher Education 6. Reviews of Information Supply for All-Union Scientific Programmes	Reviews News Releases Bibliographies
2.	Vyssahya Shkola (Higher Education) Publishers	29/14 Neglinnaya Street, Moscow, 101430 RSFSR	Manuals, Textbooks, Teaching aids Journals: Higher Education Bulletin Bulletin of the State Committee for Public Education of the USSR	Teaching methods; theoretical, scientific, reference works; posters, journals for undergraduate students and postgraduate researchers. Directives of the Committee
3.	Naukova Dumka Publishers	3 Repin Street, Kiev 4, 252601 Ukrainian SSR	Cybernetics and Computer Technology Informatics and Information Science Selection and Transfer of Information	Joint republican collections of research work
4.	Vyscha Shkola Publishers of Kiev University	7 Gogol Street, Kiev 54, 252054 Ukrainian SSR	Higher Education Problems Bulletin of Kiev University Problems in the Social Sciences	Collected research papers on problems of higher education
5.	Tartu University Publishers	18 Yulikooli Street, Tartu Estonian SSR	Problems in the Social Sciences; Problems of Higher Education	Collected research works on problems of higher education

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No. 1	Organization 2	Address 3	Publications 4	Brief Description 5
6.	Moscow University Publishers	Lenin Hills, Moscow, 119899 RSFSR	Textbooks, Teachers' manuals, Teaching aids, Monographs, Reference books, Bulletins	For students, teachers, postgraduates, and researchers
7.	Kiev Polytechnic Institute	39 Brest-Litovsk Prospekt, Kiev 56, 252056 Ukrainian SSR	Bulletin of the Kiev Polytechnic Institute	Series on methods and research
8.	Novosibirsk Electro-technical Institute	20 Marx Prospekt, Novosibirsk, 630092 RSFSR	Research into problems of higher education pedagogics and the scientific organization of training	Collected articles on scientific organization of training
9.	Vyscha Shkola Publishers of Kharkov University	4 Dzerzhinsky Square Kharkov, 310077 Ukrainian SSR	University bulletins	Collected research for undergraduates, postgraduates, teachers, and researchers
10.	Vysheishaya Shkola Publishers of Minsk	11 Masherov Prospekt, Minsk, 22048 Byelorussian SSR	Monographs, Teaching aids, Results of research	Technical aids for training, higher education and training for engineering personnel
11.	Kazan University Publishers	18 Lenin Street, Kazan, 420008 RSFSR	Monographs, Aids, Manuals, Collected works based on research	For postgraduates, undergraduates, teachers, and researchers
12.	Nauka Publishers	90 Profsoyuznaya Street, Moscow B-485, GSP-7, 117864 RSFSR	Monographs, Publications, Research results	Results of activities of institutions of the USSR Academy of Sciences. For researchers, postgraduates, teachers
13.	Lenizdat Publishers	59 Fontanka, Leningrad, 191023 RSFSR	Reference books for applicants to higher education	For students
14.	Leningrad Universities Publishers	7/9 University Embankment, Leningrad, 199034 RSFSR	Textbooks, results of research, theoretical works Bulletins of Leningrad University	Student training and higher education international co-operation. Training of specialists
15.	Molodaya Gvardia Publishers	5a Novodmitrovskaya Street, Moscow, 125015 RSFSR	Students' Meridian	Socio-economic aspects of higher education

ANNEX

No. 1	Organization 2	Address 3	Publications 4	Brief Description 5
16.	Rostov University Publishers	160 Pushkin Street, Rostov-on-the-Don, 344006 RSFSR	News of the North-Caucasus Centre of Higher Education Social Sciences	Communist upbringing of students
17.	Pedagogic Publishers	8 Lefortov Lane, Moscow, 107847 RSFSR	New research in the pedagogical sciences Books on the Pedagogical sciences Journals: Information Science and Education Soviet Pedagogics Public Education	For specialists in pedagogics, teachers, postgraduates at institutes and universities Computerization of training Pedagogical problems Problems of teacher training and teaching methods

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